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REPORT

OF THE

SUDAN MEDICAL SERVICE

FOR THE YEAR

1945

BUREAU OF HYGIENE & TROPICAL DISEASES

McCorquodale & Company (Sudan) Limited, Khartoum

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SUDAN MEDICAL SERVICE.

ANNUAL REPORT 1945.

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CHAPTER I.

INTRODUCTION.

The state of the public health remained satisfactory throughout the year despite the constant risk of introduction of epidemic diseases from outside the Sudan. No case of typhus or smallpox was imported but three cases of smallpox were quarantined in Port Sudan, having been removed from a ship calling at that port. Yellow fever was not reported and relapsing fever became less prevalent in the central Sudan coincident with the use of D.D.T. although the disease continued in the Upper Nile Province. Various adverse factors caused some shortage of millet (dura) and rations were supplemented with beans; from the nutritional point of view this was quite satisfactory but was not readily acceptable to all the people. Although malaria was more prevalent in some districts yet the incidence throughout the Sudan fell within normal limits.

Progress in curative medicine was maintained as reference to Table 1 shows. These figures mark an increase during the last two years, both in admissions to hospitals and attendances as outpatients, but there is now some indication of stabilisation. All treatment in the 3rd Class wards of hospitals was free in 1944 and 1945 and the 1945 inpatient figures show but little increase over those of 1944.

TABLE I.

Statistics of Treatment in Sudan Hospitals and Dispensaries in the last 10 *years.*

YEAR.	Admissions.	Attendances	Operations
1936	96,081	6,500,441	11,229
1937	101,088	6,675,989	12,063
1938	104,366	6,989,990	11,439
1939	105,103	7,119,973	11,253
1940	104,422	6,649,335	11,139
1941	103,023	6,330,711	10,417
1942	114,837	6,750,329	11,353
1943	112,275	6,796,372	12,726
1944	131,077	7,077,919	13,796
1945	131,571	7,897,148	15,455

The number of hospital beds now available is about one per 1000 of the population. During the year further steps were taken to improve the existing facilities in hospitals and, by the institution of new courses of training for the various categories of hospital staff, to improve the standards of nursing.

Progress in preventive medicine has also been maintained. The use of D.D.T. powder throughout the Sudan largely removed the danger of extensive outbreaks of the louse-borne diseases, typhus and relapsing fever. Anti-malarial work and measures against aedes mosquitoes were extended and improved in many parts of the country. Particular attention was given to maternity and child welfare work and a fall in the infant mortality rate was recorded in Khartoum and Omdurman. The school medical service throughout the Sudan, and the special school dental service in the Three Towns (Khartoum, Omdurman and Khartoum North), were well maintained. Much attention was given to propaganda through public health staff, medical assistants in charge of dispensaries, health visitors and midwives, whilst free use was made of the S.M.S. Graphic Museum for demonstrations to school children and others. The rural health centres, started in 1944, proved their worth and in some districts made a notable contribution to the education of local people in health matters.

A Nutrition Committee was set up and at its first meetings devised optimal and minimal dietary requirements for the various population groups.

Research was carried out on the immunological relationships of the alastrim viruses, on the treatment of kala-azar (leishmaniasis) with sodium antimony gluconate and with penicillin, on methods of titrating the potency of penicillin, on the aetiology of leishmaniasis—including a comprehensive study of Sudan sandflies, on the photochemical changes occurring in stilbamidine and on methods of testing for cocaine hydrochloride. Observations on *Anopheles gambiae* and other mosquitoes in the Wadi Halfa area were made.

CHAPTER II.

HEALTH OF OFFICIALS.

The figures for the health of officials as shown in Table 2 below are significant of no important change in recent years.

TABLE 2.

Sudan 1945.

Health of Officials.

NATIONALITY.	Number of officials employed	Total		Average Days Sickness		Died	Invalided.
		Placed on sick list	No. of days sick	For all officials	For those who were sick		
British	728	236	2,313	2.95	9.80	1	4
Sudanese	4,172	1,359	12,729	3.05	9.36	5	24
Egyptian	351	141	1,094	3.12	7.75	—	2

CHAPTER III.

EPIDEMIC DISEASE.

1. CEREBROSPINAL MENINGITIS.

There were sporadic cases of cerebrospinal meningitis throughout the Sudan with the disease reaching epidemic proportions in the Upper Nile Province and, more particularly, in the Wau area of Equatoria. Over 6,000 cases were reported with a case mortality rate of 11 per cent. In Wau district most of the cases were treated by local hospital dressers in quarantines hastily improvised in the field. The low death rate is a tribute to the organisation of these quarantines, to the dressers' devotion to their work and to the value of sulphapyridine in treatment.

TABLE 3.

Cerebrospinal Meningitis.

Incidence in the last ten years.

YEAR.	Cases.	Deaths.	YEAR.	Cases.	Deaths
1936	13,340	8,906	1941	1,824	459
1937	446	293	1942	2,787	1,027
1938	234	124	1943	3,526	765
1939	2,714	647	1944	2,346	405
1940	4,032	796	1945	6,166	666

The distribution by Provinces was :—

PROVINCE.	Cases.	Deaths.
Blue Nile	29	13
Darfur	3	2
Equatoria	5785	574
Kassala	2	2
Khartoum	1	—
Kordofan	11	2
Northern	—	—
Upper Nile	335	73
Totals	6166	666

2. DIPHTHERIA.

There were 389 cases reported with 54 deaths as contrasted with 270 cases and 61 deaths in 1944.

TABLE 4.

Diphtheria

Incidence in the last ten years.

YEAR.	Cases.	YEAR.	Cases.
1936	63	1941	186
1937	36	1942	207
1938	51	1943	309
1939	77	1944	270
1940	114	1945	389

Increased incidence was in the Blue Nile, Kassala (including Port Sudan), Khartoum, and Northern Provinces, that is, particularly in those provinces with direct connection with neighbouring countries and having foreign elements in their populations.

The distribution by Provinces was :—

PROVINCE.	Cases.	Deaths.	PROVINCE.	Cases.	Deaths
Blue Nile	58	15	Khartoum	143	13
Darfur	1	1	Kordofan	23	6
Equatoria	1	—	Northern	90	4
Kassala	69	14	Upper Nile	4	1
			Totals	389	54

3. RELAPSING FEVER.

There were 17,392 cases reported with 444 deaths as contrasted with 22,672 cases with 310 deaths in 1944. Nearly half of the 1945 cases occurred in the Upper Nile Province in an outbreak among the Shilluk, a relatively primitive people among whom, as far as is known, the disease had not previously occurred.

Ample stocks of D.D.T. powder allowed delousing to be undertaken on a large scale and, throughout the Northern Sudan, volunteers came forward in great numbers to be freed of their lice.

The disease showed a steady decline throughout the year in the Blue Nile Province where it had been of great public health importance during the last few years.

TABLE 5.

Relapsing Fever.

Incidence in the Last Ten Years.

YEAR.	Cases.	Deaths.	YEAR.	Cases.	Deaths.
1936	22	—	1941	3,028	116
1937	374	48	1942	5,287	559
1938	1,124	116	1943	10,595	668
1939	1,006	92	1944	22,672	310
1940	1,487	45	1945	17,392	444

The distribution by Provinces was :—

PROVINCE.	Cases.	Deaths.	PROVINCE.	Cases.	Deaths
Blue Nile	4,698	37	Khartoum	681	17
Darfur	1,068	160	Kordofan	1,683	15
Equatoria	—	—	Northern	9	—
Kassala	1,779	58	Upper Nile	7,474	157
			Total	17,392	444

4. SMALLPOX.

No cases were reported in the Sudan during 1945 although three were removed from a ship at Port Sudan and treated in the local quarantine. Smallpox was, however, present during the year in Egypt, East Africa, the Belgian Congo and French Equatorial Africa—countries that are neighbours. The vaccination state in the Sudan can fortunately be considered satisfactory. The lymph used is that made by the Stack Medical Research Laboratories. No fewer than six million vaccinations have been carried out during the last eight years and 525,847 were performed during 1945.

TABLE 6.

Smallpox

Incidence in Last Ten Years.

YEAR.	Cases.	Deaths.
1936	501	132
1937	425	57
1938	527	158
1939	553	103
1940	515	104
1941	46	—
1942	12	—
1943	182	36
1944	242	51
*1945	—	—

*Three cases were removed from a ship and quarantined in Port Sudan.

CHAPTER IV.

ENDEMIC DISEASE.

1. ANCYLOSTOMIASIS.

There was no significant change in the incidence of this disease. It was present in Equatoria, and, to a much less extent, in a few parts of the Northern Province.

2. BLACKWATER FEVER.

Cases during the last six years have been :—

YEAR.	Cases	Deaths	YEAR	Cases	Deaths
1940	24	9	1943	17	3
1941	28	9	1944	11	4
1942	29	11	1945	14	2

These figures show a decline in incidence which may reflect the increasing use of mepacrine both in prophylaxis and treatment.

The nationalities of the 14 cases were, Sudanese (Arab) 8, Sudanese (Negroid) 4, and European 2.

Table 7 shows the incidence by age and sex in the various areas.

TABLE 7.

Blackwater Fever

Incidence by Age and Sex in Provinces

PROVINCE	MALE		FEMALE		AGE GROUPS IN YEARS.				
	Cases	Deaths	Cases	Deaths	5–15	15-25	25-35	35-45	45-65
Blue Nile	3	1	—	—	—	—	1	—	2
Equatoria — ...	4	—	4	—	2	1	3	—	2
Kordofan	3	1	—	—	1	—	1	1	—
TOTAL	10	2	4	—	3	1	5	1	4

3. DRACONTIASIS.

This crippling disease maintained its incidence in parts of Equatoria and in the Nuba Mountains. Improvements were made in the protection of water supplies but the development of the worm is so slow that results can only be expected to show themselves some years later.

Cases reported were 2,761 ; there were no deaths. Cases admitted to hospital were 758.

The distribution by Provinces was :—

PROVINCE.	Cases.	PROVINCE.	Cases.
Blue Nile	164	Khartoum	4
Darfur	17	Kordofan	524
Equatoria	1833	Northern	2
Kassala	137	Upper Nile	80
Total	2151		610 = 2761

4. DYSENTERIES.

Cases admitted to hospital were 3,519 as contrasted with 3,389 in 1944. Of the 3,519 cases 612 were diagnosed as the bacillary type. These figures probably do not represent the true incidence of the two diseases as facilities for bacteriological diagnosis do not exist in the smaller hospitals.

5. ENTERIC FEVER.

Cases reported were 183 with 11 deaths contrasted with 199 cases and 21 deaths in 1944.

They were mostly sporadic and a common source of infection could not be established for any group.

The distribution by Provinces was :—

PROVINCE.	Cases.	Deaths.
Blue Nile	43	2
Darfur	7	—
Equatoria	1	—
Kassala	25	1
Khartoum	68	5
Kordofan	9	1
Northern	30	2
Upper Nile	—	—
Total	183	11

TABLE 8.

Enteric Fevers

Incidence in the Last Ten Years.

Year	Cases	Year	Cases
1936	135	1941	129
1937	165	1942	167
1938	213	1943	145
1939	202	1944	199
1940	336	1945	183

6. HYDATID DISEASE.

This disease, as in previous years, was reported only among the Taposa people living in Kapoeta district. Cases were 54, a considerable increase over the 17 reported in 1944 and possibly explainable by an increased influx of patients to hospital seeking operative treatment.

7. LEISHMANIASIS.

There were 192 cases reported with 39 deaths contrasted with 201 cases and 74 deaths in 1944.

TABLE 9.

Lishmaniasis.

Incidence in the Last Ten Years.

YEAR.	Cases.	YEAR.	Cases.
1936	214	1941	494
1937	336	1942	432
1938	296	1943	225
1939	394	1944	205
1940	460	1945	192

This disease is still practically confined to the Fung District, the southern part of Kassala Province, and to a small area in Equatoria. New drugs for its treatment were tested and further work was carried out on the significance of sandfly vectors.

No cases of espundia were reported during the year. Seven cases of cutaneous leishmaniasis were reported, 2 from the Blue Nile Province and 5 from Kordofan Province.

TABLE 10.

Sudan 1945.

Visceral Leishmaniasis ; Distribution by Provinces

PROVINCE	MALE		FEMALE		AGE GROUPS IN YEARS.					
	Cases	Deaths	Cases	Deaths	1-5	5-15	15-25	25-35	35-45	45-65
BLUE NILE ...	52	18	25	—	—	19	27	19	6	6
DARFUR ...	2	—	—	1	—	—	—	2	—	—
EQUATORIA	9	1	2	—	—	6	4	1	—	—
KASSALA ...	76	10	9	3	3	9	30	34	7	2
KHARTOUM ...	8	2	1	—	—	—	4	2	3	—
KORDOFAN ...	6	2	2	—	—	5	—	2	—	1
NORTHERN ...	—	1	—	—	—	—	—	—	—	—
UPPER NILE ...	—	1	—	—	—	—	—	—	—	—
TOTAL	153	35	39	4	3	39	65	60	16	9

The racial distribution of these cases was: Sudanese (Arab) 108, Sudanese (Negroid) 80, Abyssinian 1, and Eritreans 3.

TABLE 11.

Sudan 1945.

Leishmaniasis : Results of Treatment in the Last Six Years.

	Apparently cured %	Died. %	Still under treatment %	Untreated or lost sight of %
1940	58.7	18.0	12.2	11.1
1941	47.4	28.9	11.1	12.6
1942	47.0	30.0	12.0	11.0
1943	41.0	25.0	20.5	13.5
1944	43.0	30.0	2.0	25.0
1945	49.0	24.0	15.0	12.0

8. LEPROSY.

In the Sudan leprosy is mainly, but not entirely, a disease of the southern and negroid half of the country.

TABLE 12.

Leprosy : Distribution in the Sudan.

Province	Under treatment in camps or settlements.	Under observation and treatment in hospital or as outpatients.	Total under treatment.	Under observation but not under treatment.	Total cases.
Blue Nile	39	18	57	22	79
Darfur	30	7	37	—	37
Equatoria	260	46	306	633*	939
Kassala	34	—	34	24	58
Khartoum	11	18	29	5	34
Kordofan	72	36	108	78	186
Northern	—	—	—	41	41
Upper Nile	—	5	5	—	5
TOTAL	446	130	576	803	1379

**There are in addition 3,062 known lepers under less close observation.*

Further progress was made with the establishment of village settlements which—in the Moru district of Equatoria—were supervised by a B.E.L.R.A. worker.

9. MALARIA.

There were 14,007 cases admitted to hospital with 195 deaths as contrasted with 14,079 cases with 144 deaths in 1944. There was a seasonal increase in incidence in some parts, particularly in the White Nile District. The control of mosquito breeding was closely maintained throughout the Irrigated Area of the Gezira and the many pump schemes along the Nile. Mepacrine was used extensively in treatment, and suppressively in certain places among special categories of people.

Admission to, and deaths in, hospitals by provinces were :—

Province	Admissions	Deaths
Blue Nile	3,467	76
Darfur	812	8
Equatoria	2,650	32
Kassala	2,186	21
Khartoum	765	6
Kordofan	2.051	19
Northern	1,269	10
Upper Nile	816	23
TOTAL	14,007	195

TABLE 13.

Malaria : Spleen Rates in School Children of Intermediate and Village Schools.

Province or District	Percentage Spleen Rate.				
	1941	1942	1943	1944	1945
BLUE NILE PROVINCE					
Gezira Districts	13.5	18.3	26.4	26.0	33.1
White Nile Districts	20.0	36.0	25.0	26.0	35.0
Fung Districts	41.4	41.9	27.0	?	35.4
DARFUR PROVINCE	38.4	35.9	32.1	29.3	32.0
EQUATORIA PROVINCE	34.4	43.2	18.9	43.0	45.0
KASSALA PROVINCE.					
Port Sudan District	?	1.8	2.1	2.4	2.0
Kassala District	18.4	20.5	—	40.0	21.0
Gedaref District	?	?	27.1	50.0	21.0
KHARTOUM PROVINCE	1.5	1.4	1.7	1.1	2.0
KORDOFAN PROVINCE	32.2	24.1	38.7	19.1	14.0
NORTHERN PROVINCE	7.0	7.0	5.5	11.2	16.2
UPPER NILE PROVINCE	21.2	18.8	12.0	11.7	10.1

10. RABIES.

The number of persons receiving anti-rabic treatment was 49 as contrasted with 272 in 1944. Nine deaths were reported as contrasted with 4 in 1944.

TABLE 14.

Rabies and Anti-Rabic Inoculations—Cases Recorded in the Last Ten Years.

Year	Persons Treated	Deaths After Treatment	Total Deaths
1936	373	1	8
1937	534	6	11
1938	557	1	8
1939	422	8	16
1940	352	1	3
1941	407	7	14
1942	396	1	11
1943	358	—	7
1944	272	—	4
1945	63	—	9

Certain data regarding cases are given in Table 15.

TABLE 15.

Human Rabies : Details of Cases.

LOCALITY.	Case		Bite			No. of days between bite		Injections given
	Age	Sex	Animal	Site	Severity	and treatment	and death	
BLUE NILE PROVINCE.								
Roseires	38	M	Dog	Leg	Mild	21	24	3
Singa	27	M	Dog	Leg	Mild	17	26	—
Suki	43	M	Dog	Leg	Mild	15	22	—
Abu Usher	32	M	Dog	Leg	Mild	18	24	—
KASSALA PROVINCE.								
Aroma	12	M	Dog	R. Foot	Moderate	—	75	—
KORDOFAN PROVINCE.								
Rahad	25	M	Dog	R. Thigh	Not severe	—	90	—
Rahad	19	M	Dog	R. Fore-arm				
Talodi	20	M	Dog	Leg	Mild	—	60	--
Dilling	23	M	Dog	Leg	Mild	30	64	13

11. ACUTE RHEUMATISM.

Cases admitted to hospital were 280 with 2 deaths as contrasted with 281 cases with 2 deaths in 1944.

TABLE 16.

Acute Rheumatism

Incidence in the Last Seven Years

YEAR	Cases	Deaths
1939	303	4
1940	223	3
1941	356	1
1942	136	—
1943	190	3
1944	281	2
1945	280	2

The distribution of cases by provinces was :

PROVINCE.	Cases.	PROVINCE.	Cases
Blue Nile	15	Khartoum	49
Darfur	—	Kordofan	15
Equatoria	50	Northern	91
Kassala	48	Upper Nile	12
Total			280

12. SCHISTOSOMIASIS.

The incidence of the vesical form of this disease on the whole remained low in the Northern Sudan. There was, however, some indication of an increase in the incidence of both the vesical and intestinal forms in the Gezira area and a special survey was initiated to establish more clearly the incidence of the disease and the factors influencing it. This survey is still in progress.

TABLE 17.

Schistosomiasis

Gezira: Incidence in the Indigenous Population.

YEAR	S. HAEMATOBIUM						S. MANSONI					
	Children		Adults		All ages		Children		Adults		All ages	
	Exam.	% Inf.	Exam.	% Inf.	Exam.	% Inf.	Exam.	% Inf.	Exam.	% Inf.	Exam.	% Inf.
1943	11,929	1.19	32,220	0.99	44,249	1.00	—	—	—	—	—	—
1944	29,966	3.17	57,196	0.89	87,162	1.60	—	—	—	—	—	—
1945	12,133	5.5	22,681	1.9	34,814	3.2	3,926	6.3	9,546	1.9	12,472	3.2

In the irrigated district of the Zeidab Scheme near Atbara *S. mansoni* is a perennial trouble and its control is still a public health problem.

TABLE 18.

Merowe and Dongola Districts: Incidence of S. Haematobium Infection.

YEAR.	Number Examined.	% Infected
1943	17,445	3.5
1944	27,309	4.4
1945	12,146	3.3

TABLE 19.

Schistosomiasis

Halfa District: Incidence of S. Haematobium Infection.

YEAR.	Number Examined.	% Infected
1943	7,201	17.5
1944	6,873	18.2
1945	4,169	19.8

13. TRYPANOSOMIASIS.

There were 39 cases reported in Equatoria Province contrasted with 80 in 1944.

TABLE 20.

Trypanosomiasis

Incidence in the Last Ten Years.

YEAR	Yubu	Yambio	Yei	Kajo-Kaji	Meridi	Other Localities	Imported
1936	142	—	—	8	—	—	—
1937	63	1	2	23	—	—	—
1938	106	—	—	4	—	—	—
1939	103	—	—	6	—	—	—
1940	80	—	—	—	—	—	1
1941	69	—	—	1	47	—	8
1942	48	—	—	2	25	—	—
1943	60	—	8	1	9	—	3
1944	37	—	35	—	4	4	—
1945	16	1	19	—	—	3	—

Palpations carried out during the year were 452,324, and 5,372 gland punctures were made. The local outbreak in the Yei district showed a notable decline, from 35 cases in 1944 to 19 only in 1945, and is now considered to be under control. No case was reported from the Meridi area where there had been 47 cases in 1941. The new system of rod clearings was tested out in the Yei district ; much less work is required to establish and to maintain these clearings and they are less liable to be a cause of soil erosion than the old, large, square block clearings.

14. TUBERCULOSIS.

The figures for tuberculosis in the Sudan indicate an apparent gradual increase but so many variable factors are at work such as increasing disease consciousness, more refined diagnosis, better notification, increasing urbanization and war experience that it is impossible to draw clear deductions from the figures.

There was an increase in the number of admissions to hospital for tuberculosis from 1,428 in 1944 to 1,600 in 1945. This increase is shown particularly in the pulmonary cases whilst in 1944 there was an increase in both pulmonary and non-pulmonary cases compared with 1943.

There were more cases of pulmonary tuberculosis in 1945 among all classes of people except soldiers, sailors, police, and clerks whilst the incidence of the disease fell most heavily in the age group 25-35 years.

Increasing attention was given, particularly in Khartoum Province, to the examination of contacts of cases living at home and to welfare work and health teaching among them.

TABLE 21.

Tuberculosis Admissions to Hospitals in the Last Ten Years

YEAR.	Pulmonary	Non-Pulmonary	Total
	Admissions	Admissions	Admissions
1936	519	349	868
1937	488	395	883
1938	623	404	1,027
1939	685	396	1,081
1940	579	457	1,036
1941	631	511	1,142
1942	671	505	1,192
1943	593	529	1,122
1944	796	632	1,428
1945	957	643	1,600

The Northern and Southern Sudan show similar trends.

TABLE 22.

Tuberculosis

Admissions to Hospitals in the last five years contrasted for the Northern and Southern Regions.

	1941		1942		1943		1944		1945	
	Pul.	Non-pul.	Pul.	Non-pul.	Pul.	Non-pul.	Pul.	Non-Pul.	Pul.	Non-pul.
NORTHERN SUDAN. Admissions for T.B.	505	452	568	445	516	483	677	526	845	508
SOUTHERN SUDAN. Amissions for T.B.	126	59	103	60	77	46	119	106	112	135

The heaviest incidence in pulmonary tuberculosis is in early middle age in both the Northern and Southern Sudan.

TABLE 23.

Pulmonary Tuberculosis

Analysis by Age-Groups of Hospital Admissions

Part of Country	AGE GROUPS IN YEARS.														65 and over		Unknewn	
	0-1		1-5		5-15		15-25		25-35		35-45		45-65					
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
Northern Sudan	–	–	3	–	31	4	185	35	323	46	143	27	99	29	19	10	3	—
Southern Sudan	–	–	1	–	4	–	43	10	54	13	39	4	9	3	1	–	—	—

Analysis by occupation groups indicates little without relationship to the numbers at risk in these groups and unfortunately these figures are not available.

TABLE 24.

Pulmonary Tuberculosis

Analysis by Occupation of Admissions to Hospitals in the last six years.

	Prisoners	Cultivators.	Nomads.	Soldiers, Sailors and Police.	Labourers.	Artisans & Shop-Keepers.	Clerks.	Servants.	Indigent and un-employed.	Women not employed	Children.	Unclassified	TOTAL.
1940 ...	—	132	—	15	62	25	14	15	107	100	10	—	480
1941	—	182	10	32	92	28	16	11	80	141	40	—	631
1942 ...	—	239	—	21	61	32	5	17	34	123	8	131	671
1943 ...	21	129	—	25	113	44	12	31	113	81	3	21	593
1944	—	171	—	47	132	25	25	15	165	159	12	45	796
1945 ...	—	191	7	41	159	65	21	25	170	197	25	56	957

Cases of non-pulmonary tuberculosis show a similar distribution to that of pulmonary tuberculosis in age-groups in both the Northern and Southern Sudan

Table 25.

Non-Pulmonary Tuberculosis

Part of Country	AGE GROUPS IN YEARS.							
	0-1	1-5	5-15	15-25	25-35	35-45	45-65	65 & over
Northern Sudan	2	15	62	121	140	61	42	10
Southern Sudan	1	10	33	42	44	33	11	1

Bovine tuberculosis is a rarity in the Sudan and most cases of the non-pulmonary form are considered to be infected from adult cases of pulmonary disease of the human strain.

Table 26.

Non-Pulmonary Tuberculosis : 1945 *Analysis by site of Lesion of Hospital Admissions*

	Gland	Bone	Joint	Other	TOTAL
Northern Sudan	174	178	62	94	508
Southern Sudan	47	57	21	10	135

15. TUMOURS.

Recorded cases numbered 668 and were classified as :—

Malignant :	carcinoma	171
,,	sarcoma	33
,,	undifferentiated	77
,,	Total	281
Benign		387
Total all tumours		668

Table 27.

Tumours

Incidence in the Last Six Years

NORTHERN SUDAN.

YEAR.	Malignant	Non-Malignant	TOTAL
1940	205	259	464
1941	221	264	485
1942	164	205	369
1943	291	457	748
1944	217	664	881
1945	211	280	491

SOUTHERN SUDAN.

Year	Malignant	Non-Malignant	Total
1940	15	66	81
1941	34	61	95
1942	11	62	73
1943	6	34	40
1944	20	96	116
1945	70	107	177

16. UNDULANT FEVER.

There were 70 cases reported with 2 deaths compared with 66 cases and 3 deaths in 1944.

TABLE 28.

Undulant Fever

Incidence in the Last Ten Years.

Year.	Cases.	Year	Cases.
1936	58	1941	31
1937	33	1942	17
1938	28	1943	55
1939	29	1944	66
1940	43	1945	70

17. VENEREAL DISEASES.

There were 108,467 cases reported; of these 20,710 cases were admitted to hospital.

The distribution by Provinces was:

PROVINCE.	Cases.
Blue Nile	20,348
Darfur	14,585
Equatoria	8,043
Kassala	16,795
Khartoum	8,402
Kordofan	26,483
Northern	5,292
Upper Nile	8,519
TOTAL	108,467

There was no significant change in the incidence of these diseases. Syphilis was prevalent in Darfur Province and the Southern part of Kordofan Province—rural tribal areas—while gonorrhoea was more commonly seen in the towns. No soldier was allowed to return home on demobilization until certified to be free of venereal disease.

CHAPTER V.

PUBLIC HEALTH.

1. QUARANTINE.

At Wadi Halfa Quarantine 27,610 entrants to the Sudan were examined and measures were taken when necessary. All Third class entrants or those with lice were deloused with D.D.T. and kept under surveillance for 21 days after arrival in the Sudan. Imported labour was deloused, vaccinated, treated for ancylostomiasis, refused entry if suffering from bilharzia (labour contractors were advised beforehand) and if destined for south of 15° N. inoculated against yellow fever.

Among those examined the following cases of disease were found :—

Schistosomiasis	108
Ancylostomiasis	28
Relapsing Fever	2
Tuberculosis, pulmonary	8
Diphtheria	2
Chickenpox	38
Other diseases	214

The air quarantine requirements are that all outgoing aeroplanes from the Sudan are disinsectised by aerosol bomb, whether arriving direct from the yellow fever endemic zone or not, so that there can be no question of a mosquito of any type leaving the Sudan by air, be it *Anopheles gambiae*, *Aedes egypti* or other.

The *Aedes* index for Halfa was maintained at nil and *gambiae* control measures appear to have eradicated this mosquito from the Halfa area : these measures are steadily being extended south.

At Port Sudan two ship searchers were appointed as part of an intensified scheme to prevent ship to shore passage of rats. They inspected 78 ships. The port quarantine service dealt with 384 ships entering Port Sudan itself and 667 native craft entering Flamingo Bay, the adjoining port for native craft. None of these latter was found importing any communicable disease and none was placed in quarantine. Of the other ships, one imported 3 cases of smallpox ; those sick being Somalis. Nine ships were put in quarantine during the year, the one already mentioned for smallpox and 6 that arrived from Djibuti and 2 from Berbera, both latter places being in the yellow fever endemic area and within 5 days' sailing distance.

At the airport 285 inspections were made of aircraft. Only one mosquito was found, a *Culex sinaiticus*, a type common in Eritrea.

At the adjoining Port of Suakin, the pilgrimage port for the Sudan, the customary measures were taken and are reported on in detail on page 42.

There were 6,214 outgoing pilgrims and 6,354 returning. After the closure of the previous season's quarantine, it re-opened to deal specially with a party of some 3,000 Nigerians for repatriation through the Sudan.

At Khartoum local quarantine measures for the protection of the Three Towns (Khartoum, Omdurman and Khartoum North) were applied as usual to control the advent of mosquitoes from other areas. North bound trains to Khartoum between August and December, the rainy season, were held up at Soba, south of Khartoum till daylight and inspected and flitted ; mosquitoes found numbered 166. River quarantine posts for the Blue Nile and White Nile dealt with 95 steamers, 202 barges, and 1,136 native boats. By the air quarantine service, 530 civil aircraft were inspected and disinsectised. The *Aedes* index was maintained at nil.

At Malakal airport 1,068 northbound and 1,340 southbound aircraft were inspected. Mosquitoes were occasionally found in aircraft which had stopped overnight during the rainy season—June to November. Both northbound and southbound steamers were inspected by the staff at Kosti, Malakal and Juba and yellow fever inoculation states of steamer personnel checked.

At Juba, in Equatoria 3,100 inspections of aircraft were made, an increase of 887 on last year's figures. Sleeping sickness control in Equatoria by a frontier pass system was functioning as hitherto.

The desirability of measures to prevent illicit pilgrim passengers crossing from the Hedjaz by dhow to the Eritrean coast and thence filtering in through the Kassala frontier is under consideration. The western and south-western frontiers remain a potential danger from the introduction of smallpox and relapsing fever from adjoining countries but limited control only is possible.

2. ANTENATAL AND MATERNITY SERVICE.

In the Blue Nile Province at Wad Medani the new cases seen at the antenatal clinics were 995 contrasting with 851 in 1944 and 653 in 1943. An antenatal clinic was started for the first time in Roseires.

In Kassala Province an antenatal clinic was held in Kassala hospital throughout the year. It is reported that during the year 313 new cases were seen and of these 151 were found to need treatment (albuminaria 73, malaria 51, anaemia 11, syphilis 11 and dysentery 5). The average attendance at each clinic was not less than 40. Cases admitted to hospital for labour were 28, and 3 of these died; none of these three had attended the antenatal clinic. In Port Sudan three clinics operate, at the hospital, at Deim Medina and at Deim Musa. There were 1,147 attendances including 484 new cases.

In Kordofan Province in the El Obeid clinic 780 new cases contrasted with 643 for 1944. Total attendances were 2,151 contrasted with 2,354 in 1944. A new antenatal clinic at Nahud saw 210 new cases. Other clinics were started at Dilling, Um Ruaba and Soderi.

In Khartoum Province the 10 S.M.S. antenatal clinics saw 5,643 new cases contrasted with 5,103 in 1944. Of these new cases 144 were referred to hospital.

The Midwives School at Omdurman certificated 23 new midwives who were distributed to Blue Nile Province 6, Darfur Province 2, Kassala Province 4, Khartoum Province 5, Kordofan Province 3, and Northern Province 3.

3. INFANT AND CHILD WELFARE.

The infant mortality rate for Khartoum and Omdurman was 78 in each place and 79 in Khartoum North. In contrast, infant mortality for five Kakwa villages in Equatoria was 113. These figures are believed to be reasonably correct. Elsewhere, where in addition to the notifications of births and deaths being not yet compulsory, the population has not undergone census assessment to the degree of accuracy necessary for statistical computation, the position is ill-defined. The rate is known to vary considerably.

In Khartoum Province, infant and child welfare clinics operate in the Khartoum Deims (native lodging areas), Burri, Tuti, Shambat, Halfaiyet el Meluk, Omdurman Midwives School, Morada and in addition there are also those administered by the Church Missionary Society at its Omdurman Hospital and at Abu Rof, Abu Kadug, Wad Nobawi and Beit el Mal. The Government and non-government systems are not exactly comparable models of recording but they both serve the same desirable end.

The figures available are shown in Table 29.

TABLE 29.

KHARTOUM PROVINCE: 1945

Infants and Children seen at Centres and by Home Visitors.

CENTRE.	Seen at centre			Home Visits			Referred to Hospital	Vaccinations
	New	Old	Total	New	Old	Total		
Midwives School } ..	338	1,118	1,456	502	1,419	1,921	—	2,288
Morada .. .. } ..								
Khartoum Deims ..	1,071	2,190	3,261	1,744	497	2,241	34	—
Khartoum North ..	524	519	1,043	1,161	1,158	2,319	9	—
Burri	245	299	544	—	—	—	—	—
Shambat	—	—	—	139	119	258	—	—
Halfayet el Meluk ..	263	296	559	—	—	—	13	—
Province Dispensaries ..	171	84	255	—	—	—	—	—
Church Missionary Society.								
Omdurman Hospital ..	—	—	1,387	—	—	1,084	—	—
Wad Nubawi	—	—	511	—	—	510	—	—
Abu Rof	—	—	1,848	—	—	2,445	—	—
Beit el Mal	—	—	784	—	—	1,107	—	—
Abu Kadug	—	—	558	—	—	4,316	—	—
TOTALS	—	—	12,206	—	—	12,201	—	—

4. SCHOOL HEALTH.

Table 31 gives the figures for the examination of school children in various parts of the country.

In Fasher in Darfur Province there was a decrease in bilharzia in school children thought to be mainly due to stricter enforcement of the prohibition of bathing in the local water reservoir.

The figures for examination of schoolboys in Wau give an idea of the amount of public health work yet to be done. The series examined numbered 15,116 :

Diseases of the skin	73%	
Defective vision	16%	(42% in one school)
Other eye diseases	10%	
Hepatomegaly	45%	
Splenomegaly	52%	
Ancylostomiasis	15%	(28% in one school)
Schistosomiasis (intestinal)	6%	
Leprosy (clinical appearance)	1.3%	
Hernia	1%	

At the same time there was noted the relative absence of dental caries and relative frequency of knock-knees and bow-legs. The skin disease is mostly scabies. In Li Rangu on the other hand was noted the relative infrequency of chiggers and scabies as compared with ten years ago, a reasonable indication of some useful advance in hygiene in that area.

The A/Medical Officer of Health (Special Duties), a woman doctor, remarked that in the Three Towns the practice of inflicting facial cuts appears to be dying out for in a series of 620 Sudanese school-girls only 150 had facial markings while in the rural schools of Shambat and Burri 50 per cent. of girls marked had recently been done and were still in a very nervous condition. During the second half of the year 50 per cent. of girls examined had head lice. All Schools however by now have been issued with D.D.T. and applicators. Of 705 children with enlarged tonsils, 391 had palpable cervical glands and 105 faulty posture. In one group of girls in Shambat 26 out of 50 had umbilical herniae. Of 918 Sudanese girls examined by the A/Medical Officer of Health (Special Duties), 906 had the Sudanese form of severe and now (1946) illicit kind of ‘ circumcision ’ which includes infibulation and 12 the simple *Sunna* form in which there is no occlusion.

In Port Sudan area 2,145 school children were examined during the year and the following Table 30 gives some idea of their health.

TABLE 30.

1945 : *Port Sudan* :

Health of School Children in Government Schools.

Percentages.

No. examined	Physique			Peridental disease	Dental caries	Anaemia	Trachoma	Skin disease
	Good	Fair	Poor					
619	75	15	5	0.16	4	0.8	14	0.16

In the Kapoeta area, the splenic index at Nalingero School was 86.7 per cent.

TABLE 31.

1945 : *Health of Sudanese School Children.*

Province and District.	No. Exam.	% Tracho-ma	% Schisto-somiasis	% Spleno-megaly	% Ancy-lost.	% Pulm. T.B.
Blue Nile Province.						
GEZIRA AREA.						
3 Intermediate School (Boys) ..	265	32.4	3.7	8.3	—	—
2 Intermediate ,, (Girls) ..	233	19.7	—	5.6	—	—
16 Elementary ,, (Boys) ..	3921	28.4	1.7	12.2	—	—
5 ,, ,, (Girls)	841	34.3	2.9	12.1	—	—
37 Village Schools	3284	20.3	2.1	25.9	—	—
WHITE NILE AREA.						
Bakht El Ruda School	166	18.0	—	28.9	—	—
Elementary School (Boys) ..	1430	25.5	2.0	38.0	—	—
,, ,, (Girls)	564	26.9	1.2	34.4	—	—
Village Schools	976	24.5	4.2	32.0	—	—
FUNG AREA.						
Elementary School (Boys) ..	785	21.1	0.25	25.7	—	—
,, ,, (Girls)	263	16.7	—	14.8	—	—
Village Schools	412	41.2	3.1	69.0	—	—
Darfur Province.						
FASHER DISTRICT.						
Intermediate Ahlia School ..	46	1.3	2.8	5.2	—	—
Elementary School (Boys) ..	356	61.8	39.2	31.8	—	—
,, ,, (Girls) ..	112	54.4	3.5	14.2	—	—
Khalwas	322	55.9	22.0	19.8	—	—
UMM KEDDADA POST.						
Elementary School (Boys) ..	110	36.4	3.0	22.7	—	—
,, ,, (Girls)	40	30.0	—	7.5	—	—
TAWEISHA POST.						
Sub-Grade School	66	25.5	2.7	14.5	—	—
NYALA DISTRICT.						
Elementary School (Boys) ..	182	54.8	32.9	13.7	—	—
,, ,, (Girls)	58	60.3	25.8	25.8	—	—
Sub-Grade School	46	52.2	36.9	41.2	—	—
GENEINA DISTRICT.						
Elementary School	232	59.0	10.8	50.9	—	—
ZALINGI DISTRICT.						
Elementary School	176	84.0	9.0	81.8	—	—
KUTTUM DISTRICT.						
Elementary School	150	13.3	2.7	10.7	—	—
Equatoria Province.						
WAU DISTRICT.						
Elementary Schools	1282	—	6.55	48.12	15.0	—
Intermediate Schools	234	—	2.56	48.29	14.95	—
LAKES DISTRICT.						
Elementary School	94	—	2.13	29.67	21.4	—
CENTRAL DISTRICT.						
Elementary Schools	175	—	8.1	72.0	8.8	—

Province and District.	No. Exam.	% Trachoma	% Schistosomiasis	% Splenomegaly	% Ancylost.	% Pulm. T.B.
ZANDE DISTRICT.						
Elementary Schools	798	—	6.14	27.69	11.78	—
YEI DISTRICT.						
Central (Boys)	75	—	12.0	33.33	21.33	—
,, (Girls)	127	4.72	15.74	26.77	22.83	—
Intermediate Schools	118	5.0	9.32	20.34	12.77	—
TORIT DISTRICT.						
Elementary Schools	647	2.01	1.08	25.5	6.37	—
Intermediate Schools	129	—	4.65	10.08	7.75	—
MERIDI DISTRICT.						
Elementary Schools	183	15.84	41.0	50.82	15.75	—
EASTERN DISTRICT.						
Elementary Schools	68	20.57	—	86.67	—	—
Kassala Province.						
KASSALA AREA.						
Elementary	464	14.87	—	20.91	—	—
Sub-Grade	77	74.03	—	11.69	—	—
Village (Khalwa)	159	24.53	—	23.90	—	—
GEDAREF AREA.						
Elementary	1518	22.20	4.02	15.15	—	—
Sub-Grade	1120	20.14	—	28.75	—	—
PORT SUDAN						
Intermediate School	944	9.5	—	—	—	—
Elementary School (Boys)	828	28.0	0.24	0.36	—	—
,, ,, (Girls)	123	27.6	—	—	—	—
Sub-Grade School	86	59.3	—	1.2	—	—
Khalwas	164	44.5	—	2.4	—	—
Khartoum Province.						
Higher Schools (Boys)	77	20.8	—	—	—	1.3
,, ,, (Girls)	82	10.8	—	1.2	—	—
Secondary Schools (Boys)	1009	7.2	—	1.3	—	—
Intermediate Schools (Boys)	1555	10.6	—	0.8	—	—
,, ,, (Girls)	899	20.7	—	0.4	—	0.1
Mixed School	272	30.2	—	1.1	—	—
Elementary Schools (Boys)	5085	20.4	0.1	2.0	—	—
,, ,, (Girls)	1209	30.4	—	0.8	—	0.1
Technical Schools	88	30.0	—	3.4	—	—
Mahad Ulama	196	20.8	—	2.5	—	—
Village Schools (Girls)	118	20.0	—	7.6	—	—
,, ,, (Boys)	4282	20.6	—	3.8	—	—
Kordofan Province.						
CENTRAL DISTRICT.						
1 Intermediate School (Boys)	157	7.0	8.9	12.1	—	—
1 Intermediate (Ahlia) ,,	145	6.8	4.1	1.3	—	—
2 Elementary Schools (Boys)	350	10.0	3.1	11.7	—	—
1 ,, ,, (Girls)	157	14.6	0.6	—	—	—
1 Nahda School	89	7.8	5.6	11.2	—	—
1 Sub-Grade School	45	20.0	2.2	11.1	—	—
EASTERN KORDOFAN.						
3 Elementary Schools (Boys)	503	11.5	14.1	17.8	—	—
2 ,, ,, (Girls)	155	4.5	4.6	5.5	—	—
1 Sub-Grade School	89	15.7	20.2	12.3	—	—

Province and District.	No. Exam.	% Tracho-ma	% Schisto-somiasis	% Spleno-megaly	% Ancy-lost.	% Pulm. T.B.
NORTHERN KORDOFAN.						
2 Elementary Schools (Boys) ..	275	6.5	0.35	12.0	—	—
1 ,, School (Girls) ..	81	4.9	—	8.2	—	—
1 Sub-Grade School	90	5.5	3.3	5.5	—	—
WESTERN KORDOFAN.						
4 Elementary Schools (Boys) ..	737	14.3	21.8	34.0	—	—
1 ,, School (Girls) ..	124	30.5	—	1.5	—	—
9 Sub-Grade Schools	538	22.4	5.8	41.6	—	—
WESTERN JEBELS.						
3 Elementary Schools (Boys) ..	547	15.0	20.4	27.0	—	—
1 Sub-Grade School	67	41.7	34.3	58.2	—	—
Northern Province.	FIGURES NOT AVAILABLE.					
Upper Nile Province.						

5. RURAL HEALTH.

During the year, a rural health centre in each province was established in a selected dispensary in an appropriate focus of rural population and staffed with a Medical Assistant who had received a special course of a year's duration in urban and rural sanitation with the emphasis on the latter. Accommodation in these centres was improved or added to and models and charts were supplied for propaganda purposes.

The intention is to extend these attributes to all suitable dispensaries so that ultimately the rural dispensary instead of being mainly a treatment centre will combine with it the following functions to a greater degree than has been the case in the past :—

(a) antenatal clinic—held by local midwives,

(b) centre where a doctor, sanitary expert, health visitor or a midwife may be consulted on a definite day at a definite time once monthly or oftener,

(c) centre for anti-mosquito, anti-fly, anti-snail and anti-louse measures,

(d) centre for vaccination,

(e) centre for notification of births and deaths,

(f) centre where advice on buildings, incinerators, latrines, well-heads and such like may be sought,

(g) centre for propaganda, with posters, leaflets, models and talks to village councils and schoolboys,

(h) centre for the home-visiting of tuberculosis and leprosy cases and contacts, and

(i) centre for distribution of fruit and shade-tree seedlings.

During the year the following new dressing stations or dispensaries were opened :

Blue Nile Province	—	Kunuz and Sharafa.
Kassala Province	—	Ghadambaliya and Leiya.
Khartoum Province	—	Old Deims.
Kordofan Province	—	Abu Haraz, Ga'a and Um Badr.

In Gedaref area a useful drive in village sanitation has been set afoot by the Rural District Council through the medium of Rural Sanitary Orders. In the Southern Fung Area of the Blue Nile Province a treatment clinic for lepers has been opened at Soda in the Ingessana Hills for the pagan Ingessana tribesmen. Another and bigger centre of a developed type already exists near Roseires for local Islamic races.

6. NUTRITION.

A Sudan Medical Service departmental nutrition committee was formed early in the year, its composition being : the Assistant Director (Public Health) Chairman, the Assistant Director (Research), the Medical Officer of Health Khartoum, and the Assistant Medical Officer of Health Khartoum. Directors of the Department of Agriculture and Forests and of the Veterinary Service had members of their staff in attendance. The Committee held meetings in March and May and made recommendations on the following matters :

(a) Minimal and optimal daily requirements in food values for the Sudan.

(b) The merits and demerits of a wider use of maize, white and yellow, as a staple; and if used the need for its association—more particularly the white form—with other foods, particularly those of the protective category.

(c) The desirability of an extension of peanut cultivation.

(d) The desirability of *dom* palm and *mesquite* planting because of their influence direct and indirect on the food supply of the poorer communities, *dom* nuts being edible and various parts of the tree having economic value and *mesquite* providing food for goats and to a useful degree for children also.

(e) S.M.S. hospital diets were considered and recommendations made regarding rectification of deficiencies in calories, protein, salt, iron, and ascorbic acid.

(f) The desirability of planting fruit trees and vegetable gardens in hospitals and dispensaries wherever possible.

Later in the year this departmental committee was reconstituted and widened, the new composition being: a representative of the Civil Secretary, the Assistant Director (Public Health) S.M.S., the Assistant Director (Research) S.M.S., a representative of the Director of Education, a representative of the Director of Agriculture and Forests, a representative of the Director of the Veterinary Service and two Sudanese doctors.

Its terms of reference are: "To co-ordinate and consider matters relating to human nutrition in the Sudan and to report on them, making recommendations when appropriate, to the Director, Sudan Medical Service."

In addition to this central departmental committee the Province of Equatoria has its own nutrition committee; this is composed of representatives of the political, agricultural, educational, veterinary and medical services.

During the year advice was given by the S.M.S. Directorate on the subject of school diets in various parts of the country and emphasis laid on using fruits and salad leaves from the 'bush' where gardens and imported fresh vegetable products are non-existent. A form was evolved for issue to hospitals, which in conjunction with a book of tables of food values enables a local diet to be assessed and its deficiencies appreciated, with a minimum of trouble to the investigator. With a view to standardizing infant feeding schemes and utilising Sudan natural products a bulletin on the feeding of Sudanese infants has been evolved and published. A course of ten lectures on Nutrition was introduced into the curriculum of the Kitchener School of Medicine for final year sutdents.

The Senior Medical Inspector in the Zande area where milk and meat are unobtainable owing to 'fly', records that efforts are being made to balance school diets with local sources of protein and calcium. Soya bean flour has been successfully used in the local hospital mixed with eleusine millet and cassava flours to the extent of 25 per cent. to 50 per cent. Two South African procedures have been found useful, indeed necessary, to render the mixture palatable. They are:

(a) light baking of the beans before grinding, and

(b) the addition of a little maize during the grinding to take up the excess of oil.

Khartoum Civil Hospital and Omdurman Civil Hospital developed useful gardens during the year and that of the Khartoum North Hospital was developed as a fruit-tree nursery. From it, Khartoum Public Health Department distributed 727 orange, lemon, guava, nebaq, pawpaw and mango seedlings to dispensaries, prisons, schools, hospitals and staff quarters. In Wad Medani half the local hospitals' vegetable needs were supplied by the garden in its peak season.

There was a shortage of grain in the Wau area. The local Senior Medical Inspector reports malnutrition among the local Dinka as witnessed by wasting, stomatitis, cancrum oris, marasmus and night blindness. He notes that the severest epidemic of cerebrospinal fever was in the Jur River District where food shortage had been most acute.

The Province Medical Inspector at Port Sudan reports that a certain amount of malnutrition exists chiefly among the floating population among whom cases of scurvy and tropical ulcer were most prevalent. Their diet is mainly millet and sesame oil. The Province Medical Inspector of the Upper Nile Province draws attention to the relative infrequency of leprosy among the game and fish eating Nilotics as compared with the non-meat-eating tribes of Equatoria. The Assistant Medical Officer of Health (Special Duties) Khartoum, examined 2,311 girls during the year and considered that amongst those in rural schools 50 per cent. were of a physique suggesting that they were under nourished.

7. LEGISLATION.

Given below is a *resume* of the legislation affecting health enacted during the year :

(a) The Quarantine (Aircraft) Amendment Regulations 1945 (1945 L.R.O. No. 35) define anew the yellow fever endemic and non-endemic areas in the Sudan, and outside it.

(b) The Quarantine (Yellow Fever) Regulations 1945 L.R.O. No. 40. The yellow fever endemic and non-endemic areas in the Sudan were defined anew as were also, valid inoculation certificate (10 days to 4 years) location certificate (6 days) and urgency certificate. The nature and staffing of aerodromes in the yellow fever endemic area were further adjusted to accord with current international recommendations. Disinsectization of aircraft was dealt with anew, the passage of travellers from the endemic into non-endemic areas in the Sudan was further covered as was also the departure, from the Sudan as a whole, of any person, for a country in which there may be conditions permitting of the development of yellow fever.

(c) The Public Health (Amendment) Ordinance 1945 (1945 Ordinance No. 6) enables the list of communicable diseases to be amended by deletion as well as by addition.

(d) The Public Health (Amendment) Order 1945 (1945 L.R.O. No. 57) added yaws, guinea-worm and filariasis to Class B of the communicable diseases, and removed from it, the anomalous inclusion of some deficiency diseases and sprue.

8. HEALTH IN PROVINCES.

(a) BLUE NILE PROVINCE.

Area	54,755 sq.m.	Population	1,497,538
Beds	1,243	Per 10,000 population	8
Inpatient Admissions	17,945	,, ,, ,,	120
Outpatient Attendances	1,867,349	,, ,, ,,	12,469
Vaccinations	91,763	,, ,, ,,	612

TABLE 32.

Medical and Health Staff

CATEGORY.	British	Sudanese	Total
Doctor	5	14	19
Nursing Sister	2	—	2
Medical Assistant	—	105	105
Hospital Attendant	—	259	259
Public Health Inspector	2	—	2
Public Health Officer	—	9	9
Sanitary Overseer	—	19	19
Mosquitoman	—	229	229

TABLE 33.

Blue Nile Province

Work in Hospitals and Dispensaries.

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Wad Medani Hospital and Southern Gezira districts	377	6,730	1,024	538,219
Abu Usher Hospital and Northern Gezira districts	206	3,109	366	504,644
White Nile Hospitals and their dispensaries	221	3,603	513	474,907
Fung Hospitals and their dispensaries ..	439	4,503	690	349,579
TOTALS	1,243	17,945	2,593	1,867,349

Rainfall was moderate in the Province as a whole, and late in the north of the Province. Nevertheless the incidence of malaria was high ; there being records of 112,453 cases treated as contrasted with 103,596 in 1944. The spleen rate in school children for the Province as a whole was 25.7 per cent. In the White Nile area malaria cases treated numbered 34,813 as contrasted with 27,210 in 1944, an increase of 1.27 per cent. A programme of increased mosquito control in the reservoir area is under way.

The decrease in the relapsing fever incidence since 1944, 4,698 cases as against 14,231 was dramatic and is attributed to the successful introduction of D.D.T. dusting, and the persistent delousing during the hot and rainy seasons of a disease-reservoir area, the villages between the two Niles, from which it is considered the annual post ' rains ' and winter epidemics largely originate, directly or indirectly.

The conclusion of a special schistosomiasis survey of the Gezira Irrigated Area, showed that both *mansoni* and *haematobium* infections are present in all blocks in varying relative proportions of infections found in the totals of persons examined over the last three years.

TABLE 34.

Schistosomiasis in the Indigenous Population
Gezira Irrigated Area : Percentage
Incidence Annually 1943-45.
(*Figures from routine examinations of natives*)

YEAR.	GROUPS.								
	Children			Adults			All ages		
	Numb.	Infec.	%	Numb.	Infec.	%	Numb.	Infec.	%
S. haematobium.									
1943 ..	11,929	143	1.19	32,320	321	0.99	44,249	464	1.0
1944 ..	29,966	940	3.17	57,196	511	0.89	87,162	1,451	1.6
1945 ..	12,133	632	5.1	22,681	399	1.7	34,814	1,031	2.9
S. mansoni.									
1943 ..	—	—	—	—	—	—	—	—	—
1944 ..	—	—	—	—	—	—	—	—	—
1945 ..	3,926	218	5.5	8,546	153	1.7	13,472	372	2.7

For the Northern District of the Gezira Irrigated area the figures are as shown in the table that follows. The trend of advance as shown.

TABLE 35.

S. Haematobium Infection in the Indigenous Population
Northern Gezira : Percentage
Incidence Annually : 1943-45.
(*Figures from routine examinations of natives*)

Year.	Children	Adults	All ages
1943 ..	3.55	0.73	1.67
1944 ..	4.40	1.12	2.43
1945 ..	5.75	1.9	3.22

Hospitalisation figures for both species are of interest and are tabulated here.

TABLE 36.

1945 : *Schistosomaiasis in the Blue Nile Province : New Cases,*
Admissions and Deaths in Hospitals and Dispensaries.

YEAR.	New cases	Admissions*	Deaths
1944 ..	3,312	425	13
1945 ..	4,820	410	17

**Most cases are treated as outpatients.*

During the year the formulation was initiated of a programme for intenser measures of control which it is intended to apply in 1946.

Cases of pulmonary tuberculosis admitted to hospitals were 140, (deaths 25) and of the non-pulmonary form 124, (deaths 8). Leishmaniasis remains a major problem in the Fung area, the visceral form being notably endemic round Singa and tropical sores in the southern hills. The leper colony at Roseires is receiving new accommodation which is under construction and the projected leper colony at Soda for the Ingessana has been heralded by the institution of a small treatment clinic. A 50 per cent. increase in the number of cases of enteric fever in Kosti, where water supply is the crude river water again drew attention to the need for a treated water-supply.

Attention was given to the hospital garden in Wad Medani with the very satisfactory result that in the peak season half the hospitals' vegetable needs came from its own garden. The Medani antenatal clinic showed an increased attendance (995 new cases) and an antenatal clinic was started in Roseires.

In spite of difficulties due to shortage of technical sanitary staff in relation to the volume of work and the dilapidated condition of the local S.M.S. motor transport most of which is due for replacement, the major perennial problems, relapsing fever, bilharzia and malaria were dealt with, the first to a very satisfactory degree, bilharzia, to the extent of the situation being reassessed and counter-measures formulated and malaria in that the normal degree of prevention and treatment was carried on.

Dam conditions in the White Nile in relation to health received the attention of a meeting of experts in Khartoum whose views were then considered by the combined District Boards of Health of Dueim and Kosti. Their recommendations are being submitted to the Province Board of Public Health and no doubt are the herald of increased preventive measures in particular application to mosquito breeding.

The state of health of school children is sufficiently set forth in Table 31 (page 20) Splenomegaly and trachoma rates for boys and girls of the Province as a whole were, splenomegaly 24 per cent. and 18 per cent. and trachoma 26 per cent. and 28 per cent. respectively.

(b) DARFUR PROVINCE.

Area	138,150 sq.m.	Population	794,190
Beds	370	Per 10,000 population	4
Inpatient Admissions	10,370	,, ,, ,,	130
Outpatient Attendances	381,245	,, ,, ,,	4,800
Vaccinations	61,384	,, ,, ,,	773

TABLE 37.

Medical and Health Staff.

CATEGORY.	British	Sudanese	Total
Doctor	2	3	5
Nursing Sister	—	—	—
Medical Assistant	—	15	15
Hospital Attendant	—	99	99
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	2	2
Mosquitoman	—	61	61

TABLE 38.

Darfur Province : 1945.

Work in Hospitals and Dispensaries.

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Fasher	169	2,088	374	119,727
Nyala	75	617	292	36,177
Geneina..	82	1,250	264	34,098
Dispensaries	44	6,415	—	191,243
TOTAL	370	10,370	930	381,245

Rainfall was good and the food situation satisfactory, there being grain for export eastwards from the Province.

There were 6,839 cases of malaria recorded in the Province without any case of blackwater fever. The spleen rate in school children varied from 5 per cent. in well-to-do Fasher boys to 82 per cent. in the Zalingei elementary school.

Enemic relapsing fever has smouldered on with a low mortality 1,068 cases, 160 deaths, contrasted with 1,055 cases and 109 deaths in 1944. With the advent of D.D.T. and its popularisation reasonable control should be easy, eradication being more difficult owing to probable perennial import of cases from over the western frontier.

Both *haematobium* and *mansoni* forms of schistosomiasis occur ; the total cases were 1,050 of which 2 only were *mansoni*.

Dracontiasis is believed to be fairly common in the south of the Province but hospital and dispensary returns do not reflect a severe incidence, the cases recorded being 17 only. A widespread introduction of protected well-heads would have to be balanced with cost and available labour and materials in relation to the degree of invalidism caused.

Vaccinations against smallpox were 61,384 as contrasted with 139,303 in 1944. In most adults there is evidence of at least one successful vaccination but in those below 7 years of age this is not so. There were no cases of smallpox during the year whereas there were three imported cases in 1944.

Syphilis with a record of 13,062 cases treated ranks high on the list of prominent diseases. The Province Medical Inspector notes the apparent rarity of tertiary syphilis and that there is no undue degree of complaint of sterility and abortion, although the average patient can only be induced to stay for three injections of bismuth which generally suffice to clear up the skin lesions. He raises the points of there being a tolerance developing in the stock or of the disease being of a different intrinsic nature from accidental syphilis.

Tropical ulcers, numbering 605 cases as recorded, are noted to be associated with a poor standard of living, implying malnutrition. Malaria and syphilis no doubt contribute also to the indolence of many of these ulcers. There are 37 lepers recorded for Darfur. Cases of pulmonary tuberculosis recorded were 21 and of non-pulmonary 18.

The state of health of school children is shown in Table 31 (page 20). Splenomegaly, schistosomiasis and trachoma rates for the government schools in the

Province as a whole were, boys, 32 per cent., 21 per cent. and 54 per cent, and girls 16 per cent. 9 per cent. and 51 per cent., respectively.

The main grounds on which military recruits were rejected were defective vision, splenomegaly, hepatomegaly and schistosomiasis.

(c) EQUATORIA PROVINCE.

Area	159,025 sq.m.	Population	1,292,411
Beds	1,797	Per 10,000 population	14
Inpatient Admissions	35,384	,, ,, ,,	266
Outpatient Attendances	1,007,133	,, ,, ,,	7,079
Vaccinations	155,049	,, ,, ,,	1,199

TABLE 39.

Medical And Health Staff.

CATEGORY.	British	Sudanese	Total
Doctor	5	13	18
Nursing Sister	2	—	2
Medical Assistant	—	38	38
Hospital Attendant	—	210	210
Public Health Inspector	1	—	1
Public Health Officer	—	—	—
Sanitary Overseer	—	12	12
Mosquitoman	—	79	79

TABLE 40.

Equatoria Province : 1945.

Work in Hospitals and Dispensaries.

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Juba Hospital	365	7,074	497	109,109
Juba Dispensaries	36	1,449	—	64,545
Kapoeta Hospital	60	676	112	7,444
Kapoeta Dispensaries	29	1,894	—	23,728
Torit Hospital	71	2,063	92	34,945
Torit Dispensaries	47	1,331	—	111,294
Li Rangu Hospital	105	1,030	369	19,667
Li Rangu Dispensaries	101	2,203	—	39,360
Source Yubu Hospital	72	1,249	155	13,954
Source Yubu Dispensaries	56	2,014	44	20,298
Meridi Hospital	98	731	102	23,881
Meridi Dispensaries	65	1,092	—	19,121
Yei Hospital	56	1,242	163	52,927
Yei Dispensaries	58	692	17	158,001
Rumbek Hospital	176	1,774	146	19,933
Rumbek Dispensaries	103	—	—	44,241
Wau Hospital	230	2,502	426	30,624
Wau Dispensaries	39	5,469	—	121,872
Kajo-Kaji Hospital and Dispensaries	30	—	—	—
C.M.S. Lui Hospital	—	315	167	18,253
C.M.S. Lui Dispensaries	—	584	—	73,936
TOTALS	1,797	35,384	2,260	1,007,133

The rains were rather late and the crops on the whole in the Central District were poor. There was a shortage of grain in the Wau and Rumbek areas, the harvest in Torit was below standard and grass-hoppers did damage to crops in Juba. There was an increase in the work of the hospitals and dispensaries.

Malaria cases recorded numbered 10,840. The splenic indices in school children for the different areas were Juba area 72 per cent., Wau area 52 per cent. and Meridi area 50 per cent. One case only of relapsing fever occurred. Cases of cerebrospinal meningitis admitted to hospital numbered 1128 .There was an epidemic in the Wau area, the largest it has had, cases being 3,503 with a mortality of 8.25 per cent. Cases of schistosomiasis recorded were 2,079 practically entirely of the *mansoni* type. Cases of sleeping sickness numbered 39 and cases of ancylostomiasis recorded were 4,407. This remains a major scourge of Equatoria. Cases of dracontiasis admitted were 1,833. Cases of pulmonary tuberculosis recorded were 120 and of non-pulmonary 46. There are leper colonies at Li Rangu, Lui and Meridi. The sleeping sickness situation calls for no comment. Cases recorded numbered 39. Vaccinations against smallpox were 155,049 and inoculations against yellow fever were 262, these were mainly for travellers and officials.

In the Torit area there was an epidemic of cerebrospinal meningitis of 42 cases. Of endemic diseases ancylostomiasis cases were 366, schistosomiasis 210, dracontiasis 315, malaria 2,292, and yaws 8,452. In school children the spleen index was 22.8 per cent. There has been a big increase in hospitalisation due to treatment of local military personnel temporarily on duty in the area. Malaria was high and affected mainly the introduced northern troops and artisans. Spraying of military and civilian premises with D.D.T. was done quarterly.

In the Kapoeta area where there are no cases of schistosomiasis and ancylostomiasis amongst the local inhabitants, efforts are being made to prevent their introduction by the examination and treatment where necessary of non-local Africans, soldiers and traders for example who may enter the area. There was a local outbreak of meningitis. Hydatid disease and kala-azar remain the local diseases of peculiar interest.

In the Zande area the commencement of work on the Zande Development Scheme in which portions of the Zande population whose total numbers are about 200,000 are to be resettled in model villages and agricultural schemes, initially mainly for the growing of cotton, is raising the question of the development of the health organization associated with it, extension and intensification being necessary. The main diseases to be countered are venereal disease, leprosy, ancylostomiasis, schistosomiasis and malaria. Water supplies and pit latrines are naturally figuring prominently in discussions. Endemic goitre occurs to some extent. A case of hydatid disease in this area was recently reported. Sleeping sickness inspections provide a considerable tax on the time of local staff. Scabies, which is prevalent is now treated by a locally produced derris root ointment. A useful method of incorporating soya bean meal with millet and cassava flours is in use locally. Compost pits on the Balfour Indore system are in use in Li Rangu.

The incidence of sleeping sickness in the heaviest infected part of the area—Tembura—is less than 1 per cent. of the population and therefore is not viewed as an important problem. During the year 17 cases of *T. gambiense* infection in humans were recorded. Cases over the last 3 years are shown in Table 41.

Table 41.

Human Trypanosomiasis in Equatoria: New Cases in the last three years.

Place.	1943	1944	1945
Tembura	62	50	16
Meridi	9	4	0
Yambio	0	1	1

In the Li Rangu area crops were grown as a contribution to hospital and leper feeding. School attendance and divorce as affecting the leprous have been considered and policies formulated in that certain scholars with non-infections and non-progressive lesions are allowed to continue at school and divorce is not encouraged where the leprous partner is ' burnt out ' and only disabled. The number of cases inspected during the year was 1,873. The spleen rate in school children in Li Rangu was 28 per cent.

In the Lakes (Rumbek) area are much yaws, syphilis, ancylostomiasis and tropical ulcers. Endemic cerebrospinal meningitis became epidemic in the dry season in its usual fashion. Malaria is widespread. There was a severe epidemic of jaundice. Syphilis and yaws are grouped together as the most crippling diseases in the area. During the year no aedes infections were found. The spleen rate in school children was 29.6 per cent.

An additional underground water reservoir was constructed in Juba and the plant there now has a storage capacity of 100,000 gallons—equivalent to the consumption for a day and a half.

In the Wau area a process of controlled tipping of refuse by filling in the holes and depressions in low lying ground adjoining the Birikpo stream is thought to be producing useful results in that there has been a gradual but noticeable lessening in mosquito breeding. This has been further reduced by the filling in with concrete of rock holes in the town drains. The *aedes* index which was formerly 30 per cent. is now 1 per cent. only. Well-tops round Wau have been improved.

The C.M.S. Hospital at Lui with its 22 daughter dispensaries maintained its increase in work. There is a B.E.L.R.A. worker associated with local work among the lepers. The staff consists of a European doctor and a European sister, 1 female native dresser and 39 male dressers.

(d) KASSALA PROVINCE.

Area	134,450 sq.m.	Population	551,369
Beds	798	Per 10,000 population	14
Inpatient Admissions	12,080	,, ,, ,,	219
Outpatient Attendances	868,526	,, ,, ,,	15,752
Vaccinations	12,374	,, ,, ,,	224

Table 42.

Medical and Health Staff.

Category.	British	Sudanese	Total
Doctor	3	7	10
Nursing Sister	2	—	1
Medical Assistant	—	29	29
Hospital Attendant	—	155	155
Public Health Inspector	2	—	1
Public Health Officer	—	2	2
Sanitary Overseer	—	7	7
Mosquitoman	—	40	40

Table 43.

Kassala Province : 1945.

Work in Hospitals and Dispensaries.

Unit.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Port Sudan Hospital	276	3,930	425	212,271
Port Sudan Dispensaries	64	471	—	95,285
Kassala Hospital	206	3,700	145	108,873
Kassala Dispensaries	35	773	—	191,197
Gedaref Hospitals(2)*	178	2,792	313	93,336
Gedaref Dispensaries	39	414	—	167,564
Totals	798	12,080	883	868,526

* *There are Civil and Military Hospitals.*

Southern Area (Kassala and Gedaref)

Rainfall was heavy. Grain was short for part of the year and locusts damaged the new crop but it is not thought that the standard of nutrition was much affected. There were outbreaks of relapsing fever in Kassala and Gedaref areas, the cases being 83 with 2 deaths and 265 with 5 respectively. Malaria cases recorded were 20,627. The splenic index in school children for the Southern area as a whole was 42.0 per cent.

Schistosomiasis of the *haematobium* type to the extent of 713 cases (151 in 1944), apparently contracted locally was recorded from Gedaref District, 80 cases only being diagnosed in the Kassala area. The infection in the Gedaref area is from the *hafir* type of reservoir, a crude excavation to hold rain water ; 18 out of 26 such *hafirs* were found infected with *Bullinus* snails.

At Howata, 22 school-boys contracted dracontiasis ; it is thought from pools in the bed of the River Rahad. Other cases of the disease appear to have been infected in the Gash delta or imported. An antenatal clinic at Kassala had an average of about 40 attendances a week. There are 20 trained midwives in the Kassala and Gedaref areas, 14 employed in urban practice and 6 in rural. Prisoners' health calls for no special comment except that mumps was present to a troublesome degree. Venereal diseases show some increase in the area and remain a major problem.

In the towns there was a slight extension of the bucket system of night-soil disposal and an improvement in the means of public refuse disposal, by the building of refuse containers to replace the previous movable bins not infrequently stolen. A considerable increase in anti-mosquito work was undertaken comprising clearance and levelling of spurs on the banks of the Gash River, drain constructions, clearance and construction of reservoirs of the *hafir* type, filling in of borrow pits and deepening of the Khatmia Canal.

During the year in Gedaref 1,442 inoculations against yellow fever were given—mainly to Sudan Railways and other key employees—and 17,678 dustings with D.D.T. were done. The main source of relapsing fever outbreaks was confirmed to be the wandering immigrant from across the western boundary of Darfur.

Mepacrine prophylaxis was used on a mechanised millet production scheme of 20,000 feddans at Chadanbaliya and Leiya. It was given to officials and skilled labour only. Although rains were heavy and mosquitoes numerous only 3.5 per cent. of the total year's out-patients of 8,756 on the scheme were diagnosed as malaria. Cases of pulmonary tuberculosis for the Province as a whole (*i.e.* including Port Sudan area) were 135 (24 deaths) and for the non-pulmonary 83 (9 deaths).

Northern Area (Port Sudan)

The splenic index for the area in school children was 2 per cent. There was a sharp exacerbation of the relapsing fever epidemic in the Tokar area, in the early part of the year, the reservoir here being the Beja tribes of the Red Sea Hills.

Port Sudan's main public health problems remain the associated amoebic dysentery—of which there were 2,402 cases—and fly prevalence, particularly in the humid season. Fly breeding was common in cotton seed used as garden manure and much had to be dug up. The reconstruction of 600 bucket latrine chambers was progressed with. In connection with rat-guarding of ships from plague-infected ports, experiments were conducted to determine how far local rats could jump across water on the level: the longest jump was 3 feet 4 inches.

The total mosquito infections found in Port Sudan in 1945 were 192 *Culex spp.*, 397 *Aedes aegypti*, and 27 *Anopheles spp.* During the year 3,893 rats were caught, the number of fleas per rat being 0.6. In Suakin, attention to the disposal of local cotton seed and alteration to the quarantine drainage system have lessened fly infestation locally.

(e) KHARTOUM PROVINCE.

Area	5,700 sq.m.	Population	318,444
Beds	783	Per 10,000 population.. ..	24
Inpatient Admissions	17,813	,, ,, ,, ...	502
Outpatient Attendances ..	1,375,123	,, ,, ,, ...	41,395
Vaccinations	50,679	,, ,, ,, ...	1,591

TABLE 44.

Khartoum Province: 1945

Medical and Health Staff

CATEGORY.	British	Sudanese	Total
Doctor	9	18	27
Nursing Sister	11	—	11
Medical Assistant	—	15	15
Hospital Attendant	—	212	212
Public Health Inspector	5	—	5
Public Health Officer	—	3	3
Sanitary Overseer	—	13	13
Mosquitoman	—	114	114

TABLE 45.

Khartoum Province : 1945.

Work in Hospitals and Dispensaries.

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Khartoum Civil Hospital	314	4,769	1,520	138,426
Eye Hospital	110	1,232	2,462	84,930
Khartoum North Hospital	50	848	120	93,966
Omdurman Civil Hospital	239	6,668	941	172,593
Province Dispensaries	—	2,328	—	828,292
C.M.S. Hospital Omdurman..	70	1,968	165	28,766
C.M.S. Dispensaries	—	—	—	28,250
TOTALS	783	17,813	5,208	1,375,123

The main rains were late and the crops suffered to some extent.

The birth rates for Khartoum and Omdurman were 22 and 24 respectively, the death rates were 14 and 12 respectively and the infantile mortality rates were 87 and 78 contrasting with 93 and 95 respectively for 1944. It seems reasonable to relate the drop in this last rate to the increase in attendances at welfare centres.

Province dispensaries were structurally improved, organised with a more systematic administration as regards supplies, functions, guidance and instructions, and were used as media for health propaganda. Most of them were planted with fruit trees in addition. The intention is that they shall be health centres in miniature, rather than merely treatment centres. They saw 784,661 outpatients and did 30,976 vaccinations.

D. D. T. powder as a lousicide was used widely and supplies were issued to schools, dispensaries, midwives, prisons and touring public health units. It was marketed for sale in small shops and the campaign was supported with leaflets and press propaganda. The effect on the relapsing fever situation has been the disappearance of the peak from the seasonal graph, followed by an absence of cases. D.D.T. sells well moreover, a good omen for the future.

Khartoum North Hospital turned its garden into a fruit-tree nursery and distributed fruit-trees. Local fresh infections of malaria were 117 contrasted with 140 for the previous year and were the lowest for 10 years. The splenic index for province schools is 2 per cent. girls showing 1 per cent contrasted with the boys 2.4 per cent. The dysentery cases of both types numbered 302, some two thirds being notified from Omdurman which has a perennial fly handicap with its pit-latrine problem. The enteric fevers — 59 cases but again no fewer than 39 occurred in Omdurman. Pulmonary tuberculosis cases numbered 43 from Khartoum and 39 from Omdurman and the non-pulmonary form 2 from Khartoum and 4 from Omdurman. The pulmonary form shows a steady rise over the last 10 years, the non-pulmonary a steady decline.

An Assistant Medical Officer of Health (Special Duties) was appointed during the year and is responsible for the antenatal, midwifery, child-welfare and home-visiting services, and the health of school girls in the Province. She also acts as Province T. B. Officer and examines women and children contacts of cases. Omdurman Isolation Hospital has been adapted to fill primarily the function of a T. B. infirmary thus clearing hospital beds for cases more likely to benefit from treatment and at the same time providing against a proportion of infective incurables sowing infection amongst their kith and kin. Health Visitors, Sanitary Overseers and House-to-house Inspectors of the muncipal public health services also keep some degree of control over cases residing in their own homes. Cases and contacts are registered by card systems and contacts are regularly examined by X-ray and tuberculin cream tests, and clinically, and if frail or suspect given appropriate food supplements.

Diphtheria cases remained at their usual level.

Vaccinations done were 50,679 which following on 236,089 done in 1944, means that the Province is well protected.

The presence of endemic anthrax in the local Butana Desert nomads, the Batahin, was brought to light by the discovery of some 20 cases with 2 to 4 deaths. Dead animals are traditionally eaten and the disease appears to be feared in humans only if the lesion is on the face. An unusal case in which the cerebral meninges were attacked was diagnosed in Khartoum North. It had no relation to the Butana cases and infection is presumed to have been nasal.

Train, river boat, and air transport of mosquitoes was provided against by the usual measures.

The maternal mortality per 1000 notified live and still births was 5.9 for Khartoum and 3.7 for Omdurman respectively. There are 10 S.M.S. antenatal clinics in the Province and they saw 5643 new cases as compared with 5103 in 1944; of these 144 cases were referred to hospital in Khartoum and Khartoum North alone.

The S.M.S. Infant and Child Welfare Clinics are 7 and in addition there are 5 administered by the C.M.S. At the S.M.S. clinics mothers were given advice on 4495 occasions, infants under one year were seen on 2663 occasions and 7743 visits were made to 5753 houses.

In addition the C.M.S. at or from their five centres saw cases in homes on 5774 occasions and at the centres on 8843 occasions.

The province schools, in all of which the health of a proportion of scholars was examined during the year, number 110 regular schools and 71 of the *khalwas* type, the indigenous religious school. The Government Dental Surgeon dealt with 218 dental cases, certain cases were referred to hospitals and the 11 medical orderlies of the school medical service in the Three Towns gave treatments for trachoma and minor ailments. Altogether 14872 out of 21242 children were examined. Active trachoma cases were 3307. The signs of avitaminosis noted were vitamin A deficiency 105, B2 deficiency 138, ascorbic acid deficiency 36 and rachitic residues 463.

Prison health in the four province prisons remained satisfactory. The Province Prison itself planted an excellent fruit and vegetable garden and Omdurman Prison also planted fruit trees.

There were 16 general practitioners licensed in the Three Towns, (4 Greek, 4 Syrian, 5 Egyptian and 3 Sudanese) and 7 dentists (3 Greek, 2 Armenian, 1 Egyptian and 1 Czech). There were 5 licensed pharmacies in Khartoum and 2 in Omdurman. There were 86 trained midwives in practice in the Province. In the rural area they work in liaison with the dispensaries. Their boxes are inspected once or more monthly and they draw supplies from the dispensaries and there have their records written up. Some of the more advanced run antenatal clinics of a simple but useful nature at the dispensaries.

The public health department published eleven health propaganda articles during the year in the vernacular press, mainly on nutritional matters.

Two applicants for work as food handlers, a milk vendor and a cook, were detected as typhoid carriers in Khartoum North.

During the year 178 T. B. contacts were examined and the A/M.O.H. (Special Duties) reports that positive cases with tuberculin cream are easily read, in spite of the dark skins, a fine popular rash being both visible and palpable.

The present Khartoum mode of night-soil disposal is a double-bucket system utilising 5253 buckets. A water-borne system is under consideration and decision will have to be made shortly as there are big housing developments ahead.

During the year 147 anopheline and 418 culex infections were detected in Khartoum. The *aedes* index remained at nil.

Waste-water beds and dilapidated bucket chambers remain the most troublesome sources of fly-breeding in the city. Rats caught during the year numbered 5663.

During the year 193,668 lbs. of unsound food were destroyed. Prosecutions under health legislation numbered 584, of them 111 were for unsanitary conditions of premises, 6 for mosquito breeding and 40 for defective and insanitary latrines.

In Omdurman 859 prosecutions under health legislation were made, 118 for unsanitary premises, 4 for mosquito breeding and 93 for fly breeding. The prevalence of malaria in Abu Rof and Morada neighbourhood where native boats tie up, again draws attention to the need for boat quarantines to protect Omdurman, as Khartoum is protected, from mosquitoes imported by river craft.

In Khartoum North 403 prosecutions under health legislation were made.

(f) KORDOFAN PROVINCE.

Area	146,930 sq.m.	Population	1,335,807
Beds	1,178	Per 10,000 population	9
Inpatient Admissions	20,135	,, ,, ,,	149
Outpatient Attendances	1,340,182	,, ,, ,,	9,851
Vaccinations	18,569	,, ,, ,,	139

TABLE 46.

Kordofan Province : 1945.

Medical and Health Staff.

CATEGORY.	British	Sudanese	Total
Doctor	2	9	11
Nursing Sister	—	—	—
Medical Assistant	—	26	26
Hospital Attendant	—	164	164
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	8	8
Mosquitoman	—	102	102

TABLE 47.

Kordofan Province : 1945.

Work Done in Hospitals and Dispensaries

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
El Obeid Hospital	297	5,971	764	221,568
El Obeid Dispensaries	138	3,048	—	331,500
Nahud Hospital	89	1,206	380	117,237
Nahud Dispensaries	174	1,246	—	198,324
Kadugli Hospital	100	1,657	300	59,548
Dilling Hospital	100	1,543	304	79,469
Talodi Hospital	60	918	274	40,285
Nuba Dispensaries	220	4,060	17	267,519
MISSIONS.				
C.M.S. Dispensaries	—	—	—	—
S.U.M. Dispensaries	—	486	—	24,732
TOTALS	1,178	20,135	2,039	1,340,182

Rainfall was badly spaced and in El Obeid water rationing was again necessary. Crops on the whole however were satisfactory.

Malaria cases showed an increase over the previous year, 32348 cases contrasting with 27484 in 1944. The splenic index in school children was 12 per cent. for the central, eastern and northern part of the province, 23 per cent. for the Nuba Area (southern Kordofan) and 35 per cent. for Western Kordofan.

There was an epidemic of relapsing fever — 1683 cases as contrasted with 3676 in 1944, the drop being ascribable to the advent of D.D.T. A large incidence of mumps — 1120 cases — occurred, notable epidemics being in Nahud prison and the Hamarat West School in Nahud. A small epidemic of girdiasis dysentery occurred at Kadugli.

A health exhibit was staged at the Rahad Tribal Gathering. D.D.T. and dusters were issued to prisons, schools, dispensaries and midwives. A scheme to improve dispensary wells was set afoot. New dispensaries were opened at Abu Haraz, Ga'a and Um Badr.

Ancylostomiasis comes to light sporadically, there being 27 cases reported in 1945. Dracontiasis occurs, but mainly in the south of the Province, although one new focus has been located 12 miles east of El Obeid, in a place where rain water accumulations appear to have been infected recently only. The dysenteries maintained their usual incidence. Four leper colonies were administered, at Kadugli, Kauda, Heiban and Delami in the Nuba Area.

Schistosomiasis, of the *haematobium* type showed rather an increase, 4253 cases as contrasted with 3661 in 1944. The disease is mild and causes little inconvenience, probably due to the degree of infestation of the individual being small. Of pulmonary tuberculosis 107 cases were reported contrasting with 112 in 1944. Non-pulmonary cases numbered 110 compared with 83 in 1944. Venereal diseases continued at about their usual level and remain a major problem. There were 21828 cases of syphilis, 4237 cases of gonorrhoea and 418 of chancoroid.

As in other provinces, the equipment — such as carts and buckets — of the sanitary services continued inefficient owing to age and difficulty of repair because of shortage of repair material, a war legacy.

Aedes infections in El Obeid decreased from 109 in 1944 to 54 in 1945. The Province *aedes* control unit continued its touring, inspecting and training of local staffs in *aedes* control. The Nuba Area is the yellow fever powder magazine and increased attention is being given to tree-hole surveys and the filling in of tree holes.

A second water reservoir is under construction in El Obeid to meet the water shortage being experienced of latter years.

School-children's health was satisfactory and an improved diet for schools in the Nuba Area is being instituted. In view of its being noted that in boarding schools in which blankets are being issued there are less coughs and colds, it is proposed to extend the issue to all boarders.

The antenatal clinic in El Obeid continued popular and new ones were started at Nahud, Dilling, Um Ruaba and Soderi. Prison health was satisfactory. Missions maintained stations at Sallara, Kauda, Abri and Heiban. The local S.M.S. units were responsible for the health of the S.D.F. in Kordofan during the year.

(g) NORTHERN PROVINCE

Area	236,200 sq.m.	Population	629,135
Beds	708	Per 10,000 population.. ..	11
Inpatient Admissions	9,996	,, ,, ,, ...	155
Outpatient Attendances ..	997,160	,, ,, ,, ...	15,849
Vaccinations	25,029	,, ,, ,, ...	398

Table 48.

Northern Province : 1945

Medical and Health Staff.

Category.	British	Sudanese	Total
Doctor	2	8	10
Nursing Sister	2	—	2
Medical Assistant	—	22	22
Hospital Attendant	—	180	180
Public Health Inspector	1	—	1
Public Health Officer	—	1	
Sanitary Overseer	—	10	10
Mosquitoman	—	222	222

TABLE 49.

Northern Province : 1945

Work In Hospitals and Dispensaries

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Atbara Hospital	231	3,982	651	142,173
Atbara Dispensaries	60	—	—	363,864
Shendi Hospital	71	1,085	92	44,581
Shendi Dispensaries	—	—	—	—
Merowe Hospital	73	835	216	21,554
Merowe Dispensaries	2	—	—	86,555
Dongola Hospital	64	756	140	65,463
Dongola Dispensaries	3	—	—	91,502
Halfa Hospital	190	3,338	222	89,741
Halfa Dispensaries	14	—	—	91,727
TOTALS	708	9,996	1,321	997,160

No major epidemics occurred and no increase of endemic disease, malaria excepted during the closing months, particularly in the Atbara and Shendi areas. The splenic index in school children for the Province as a whole was 16.2 per cent.

There has been an increase in the land put under irrigation by river pumps and this is demanding extra work by the public health staff. Cattle plague was responsible for a number of deaths amongst cattle in the Merowe and Dongola District ; water-wheel (*sagia*) cultivators were affected and milk became very scarce.

Relapsing fever cases numbered only 9, of these, 4 were imported from Egypt at Halfa. As usual there was a relatively large incidence of diphtheria, 115 cases with 22 deaths ; cases unfortunately are brought late to hospital. There were 53 cases of enteric with 2 deaths. The biggest incidence was at Halfa where there were 19 cases mostly imported.

Halfa Quarantine was busy and 27610 persons passed through it (see under Chapter V.1. above, Quarantine). Vesical and some intestinal schistosomiasis is found in the riverain and irrigated areas ; during the year 1891 cases were recorded. In Merowe and Dongola Districts 3.3. per cent. of those examined were infected and in Halfa District 19.8 per cent. Ophthalmia and trachoma are the commonest complaints and 37,871 cases of the latter were recorded. There were 127 admissions for pulmonary tuberculosis with 9 deaths and 69 with 3 deaths of the non-pulmonary type.

Measures directed to the eradication of *Anopheles gambia* are steadily spreading south from Wadi Halfa.

(h) UPPER NILE PROVINCE

Area	92,270 sq.m.	Population	616,570
Beds	445	Per 10,000 population.. ..	7
Inpatient Admissions	7,855	,, ,, ,, ...	126
Outpatient Attendances ..	277,566	,, ,, ,, ...	3,570
Vaccinations	12,678	,, ,, ,, ...	206

TABLE 50.

Upper Nile Province: 1945.

Medical and Health Staff.

CATEGORY.	British	Sudanese	Total
Doctor	2	2	4
Nursing Sister	—	—	—
Medical Assistant	—	20	20
Hospital Attendant	—	68	68
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	2	2
Mosquitoman	—	64	64

TABLE 51.

Upper Nile Province: 1945

Work in Hospitals and Dispensaries.

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Malakal Hospital	288	4,580	332	48,229
Dispensaries	157	3,231	—	171,571
MISSIONS:				
C.M.S.	—	44	24	5,565
S.U.M.	—	—	—	43,535
S.I.M.	—	—	—	2,904
Dressers	—	—	—	5,762
TOTALS	445	7,855	356	277,566

Rains were of average nature and crops were reported to be good in most districts. The splenic index in school children in Malakal and Nasir was 10 per cent.

Epidemics were of cerebrospinal meningitis on Zeraf Island, 247 cases with 62 deaths and a major epidemic of relapsing fever, the biggest the Province has ever experienced, among the Shilluk. It was countered effectively once the drying off after the rains permitted free movement, by the use of D.D.T. and lethane, cases were 7,747 with 157 deaths. The opportunity was taken of doing at the same time 12,678 vaccinations.

The personnel at the R.A.F. staging camp, at the airport were increased to deal with the return of South African troops by air. Prophylactic mepacrine was used here and also in the case of imported labour and in certain outstations: results were satisfactory.

Improvements were carried out to dispensary buildings at Lul, Tonga and Melut. Improvements were also made to the hospital ship, the S.W. Lady Baker.

During the year there were 2,716 cases of malaria diagnosed microscopically, with 19 deaths ; 2,696 were cases of M.T.

Schistosomiasis—53 *haematobium* and 43 *mansoni*—were recorded in Malakal. The disease is not endemic in the Upper Nile Province and it is desired to keep it out. The incidence of leprosy among Nilotics appears trivial. The Province Medical Inspector draws attention to the possibility of a factor in diet accounting for their relative freedom as compared with the non-meat eating tribes of Equatoria.

Yaws is the major scourge of the Nilotics but fortunately yields readily to treatment which is popular. Tropical ulcers are common. During the year 412 anopheline, 601 culicine and 10 *aedes* infections were found in Malakal.

The *aedes* survey during the year covered 18,473 dwelling houses, 3,676 public buildings, 3,661 ships and stores, 912 tree holes, 825 steamers and 12,635 cement tanks. The highest index recorded was 0.2.

Aircraft bound north (1,668) and south (1,346) and 67 post-boats were inspected and controlled from the view point of mosquito infection during the year. All post-boat crews are being inoculated against yellow fever, and this is practically complete.

The Mission stations at Doleib Hill, Nasir, Zeraf and Ler continue but the medical work done by Missions as a whole is less than formerly ; there have been only two doctors present during the war instead of the usual pre-war four or five.

CHAPTER VI.

THE PILGRIMAGE FROM THE SUDAN.

Introduction.

The Pilgrimage, from Suakin and to a lesser extent from Port Sudan, was rather smaller than last year. Its duration overlaps at present with the next calendar year ahead.

The proportion of Sudanese was very much smaller (see Table 52). The majority as usual were West Africans. Their main route is via Chad, Fort Lamy, Abesher and Adri to Geneina in Dar Masalit and thence via Fasher to railhead at El Obeid. Such transit pilgrims are mainly of the races, Borgo, Bornu, Hausa and Fulani.

The Pilgrimage was clean, there being no Quarantine diseases reported. The use of D.D.T. blower applicators as a means of delousing in place of the traditional steam and razor was a popular and successful innovation. The Arafat ceremony, the culminating congregation of the season and the critical point as far as the sanitarian is concerned was on the 14th November. The usual S.M.S. Medical Mission accompanied the Pilgrimage and though primarily intended for those from he Sudan, gave treatment to all seeking it.

Composition of the Pilgrimage.

Table 52 shows the composition of the outgoing Pilgrimage over the last seven years and Table 53 similarly that of the returning Pilgrimage. In addition 3,000 West Africans were specially repatriated through the Sudan at the request of the West African authorities. For them the Quarantine at Suakin was specially reopened in August, 1945 after the closure of the previous season's Pilgrimage.

TABLE 52.

Outgoing Pilgrimages from the Sudan : 1940-1946.

NATIONALITY.	1940	1941	1942	1943	1943/44	1944/45	1945/46
Sudanese	555	165	1,419	2,500	1,312	1,434	610
West Africans and others	2,649	1,920	7,048	5,170	6,506	5,565	5,604
TOTALS	3,204	2,085	8,467	7,670	7,818	6,999	6,214

TABLE 53.

Returning Pilgrimages to the Sudan 1940-46.

NATIONALITY.	1940	1941	1942	1943	1943/44	1944/45	1945/46
Sudanese	513	207	1,381	2,530	1,289	1,441	624
West Africans and others	2,251	1,874	6,478	4,943	5,241	5,295	5,730
TOTALS	2,764	2,081	7,859	7,473	6,530	6,736	6,354

In addition some 3,000 West Africans were repatriated from the Hedjaz in August, 1945 through Suakin Quarantine prior to the Pilgrimage : they are excluded from the Table.

The first of nine outward sailings was on 17.10.45 and the last on 11.11.45 and the first of the same number of return sailings was on 29.11.45 the last being on 5.2.46. The returning 5,730 pilgrims included 257 non-Sudanese who had not left from the Sudan. Probably they had left Africa through Mombasa, Massawa and Zanzibar.

Preventive Measures.

The repatriated 3,000 West Africans passing through Suakin Quarantine at the request of the West African authorities after the closure of the previous season's Pilgrimage were deloused, and vaccinated against smallpox.

The 1945 46 Pilgrimage was clear of the five quarantine diseases. All outgoing pilgrims were vaccinated against smallpox, inoculated against cholera and deloused with D.D.T. They were at least three days in quarantine. On return they were deloused again and spent a minimum of three days in quarantine. Those not showing signs of recent successful vaccination were again vaccinated. Vaccinations were 100 per cent. successful in infants and successes with the nine sailings in all ages and both sexes were respectively 79.5 per cent., 70.9 per cent., 73.3 per cent., 78.8 per cent., 79 per cent., 79.2 per cent., 74.4 per cent., 68.8 per cent., and 72 per cent. Souvenir *zemzem* water was sterilized by heat as has been the procedure in the past. At Suakin there were 25 admissions to hospital with 5 deaths. Table 54 shows the nature of the affections.

Table 54.

Admissions and Deaths in Suakin Quarantine 1945/46 *Pilgrimage.*

Disease.	Admissions				Deaths			
	M.	F.	Ch.	Total	M.	F.	Ch.	Total
Chickenpox	—	2	—	2	—	—	—	—
Pneumonia	3	—	—	3	—	—	—	—
Diarrhoea	7	1	—	8	3	1	—	4
Gastro-enteritis of children	—	—	2	2	—	—	—	—
Wounds and ulcers	4	1	—	5	—	—	—	—
Malaria	1	—	—	1	—	—	—	—
Dysentery, amoebic	2	—	—	2	—	—	—	—
Acute generalised peritonitis	1	—	—	1	1	—	—	1
Nephritis	—	1	—	1	—	—	—	—
Totals	18	5	2	25	4	1	—	5

THE S.M.S. MEDICAL MISSION.

As in the past three years, a medical mission was sent by the Sudan Medical Service to accompany the Pilgrimage. It was staffed by a Sudanese Medical Inspector, a Sudanese Medical Officer and 13 other S.M.S. staff. It arrived at Jeddah on 18.10.45 and its last representative left there on 5.2.1946.

It functioned as a field hospital in Jeddah and as two dispensaries, one in Mecca and the other in Medina, the first travelling with the Pilgrimage from Mecca via Muna to Arafat and back to Mecca. Table 55 shows the work done.

Table 55.

1945-46 *Sudan Pilgrimage : Work of S.M.S. Medical Mission : Cases.*

Unit.	Admissions	Outpatients
Jeddah field hospital	20	5,094
Mecca-Muna-Arafat dispensary	—	2,558
Medina dispensary	—	1,764
Totals	20	9,416

TABLE 56.

1945-46 *Sudan Pilgrimage : Work of S.M.S. Mission : Diseases*

Disease	Admissions	Outpatients
T.B. pulmonary	—	13
T.B. non-pulmonary	—	3
Syphilis	—	97
Gonorrhoea	2	195
Trachoma	—	239
All other eye diseases	—	889
Wounds and injuries	3	1,331
Ear disease	—	184
Skin disease	1	74
Benign tumours	—	24
Gynaecological cases	—	8
Dysentery, amoebic	—	110
Malaria	1	100
Influenza	—	10
Pneumonia	4	8
Alimentary system, diseases of	1	670
Circulatory system, diseases of	1	131
Nervous system, diseases of	—	215
Respiratory system, diseases of	1	564
Urogenital system, diseases of	3	77
Diabetes	1	8
Fever, undiagnosed	—	102
Tropical ulcer	2	—
All other diseases	—	4,364
TOTALS	20	9,416

CHAPTER VII.

THE MEDICAL WORK OF MISSIONS.

Four Missions in the Sudan carry out medical work of a nature ranging from that of a developed hospital type to that of a dispensary or dressing station. Subventions are paid by Government in respect of the medical work done.

The Church Missionary Society has a modern hospital of 70 beds in Omdurman with an associated dispensary system, leper clinic, welfare clinic, and home visiting service. The Society has a comparable rural institution in Lui in Equatoria. In addition medical work is done at Sallara and Katcha in the Nuba Mountains area of Kordofan and at Malek, Zeraf and Ler, in the Upper Nile Province. In Omdurman the Mission also administers the Sir Lee Stack Home for the Indigent and Blind.

TABLE 57.

Church Missionary Society : Medical Work : 1945.

PLACE.	UNIT.	Outpat.. Attends	Inpat. Adms.	Major Oper.	REMARKS.
Omdurman ..	Hospital and Infant welfare centre ..	28,766	1,968	165	Laboratory examinations 4,580. Infant welfare consultations 2,471.
Abu Rof ..	Dispensary and infant welfare centre..	21,912	—	—	Infant welfare consultations 4,303.
Abu Kadog ..	Dispensary and infant welfare centre..	6,338	—	—	Infant welfare consultations 4,874.
Wad Nubawi	Infant welfare centre	—	—	—	Infant welfare consultations 1,081.
Bet el Mal ..	Infant welfare centre	—	—	—	Infant welfare consultations 1,891.
Lui	Hospital	5,274	315	167	
Zeraf ..	Hospital	5,565	44	24	
Malek ..	Dispensary ..				
Ler	Dispensary ..				
Sallara ..	Dispensary ..				
Kauda ..	Dispensary ..				

The Sudan United Mission has well-established dispensaries of an advanced type at Heiban, Abri and Kauda in the Nuba Mountains area of Kordofan.

TABLE 58.

Sudan United Mission : Medical Work : 1945.

PLACE.	UNIT.	Outpat. Attends.	Inpat. Adms.	Major Oper.	REMARKS.
Heiban ..	Dispensary ..	14,421	249	—	
Abri	Dispensary ..	9,447	150	—	
Kauda ..	Dispensary ..	864	87	—	
TOTALS ..	—	24,732	486	—	

The Sudan Interior Mission at Boin in the Upper Nile Province, where unfortunately a doctor was killed by enemy action during the war, have so far not been able to replace him. They have a dispensary at Abaiyet in Upper Nile which had during the year 2,904 outpatient attendances.

The American Mission has an infant and child welfare clinic attached to its girls' school in Khartoum North and has dispensaries in the Upper Nile Province at Doleib Hill and Nasir.

TABLE 59.

American Mission.

PLACE.	UNIT.	Outpat. Attends.	Inpat. Adms.	Major Oper.	REMARKS.
Khartoum N.					
Doleib Hill ..	Dispensary	21,500			
Nasir ..	Dispensary	22,035			
TOTALS ..		43,535			

CHAPTER VIII.

THE STACK MEDICAL RESEARCH LABORATORIES.

DR. E. S. HORGAN.

RESEARCH.

During the year investigations on possible sandfly vectors of Leishmaniasis have been resumed. In the chemotherapy of Kala-azar a trial has been made with very promising results using concentrated preparations of sodium antimony gluconate. This work is the continuation of that mentioned in the 1944 Report when smaller doses of the drug were used. In the bacteriological department trials were carried out of Leifson's selenite enrichment medium for the isolation of *Bact. typhosum.* Fuller details of these and other research activities will be found under the relevant headings.

ROUTINE AND EDUCATIONAL ACTIVITIES.

A summary of the routine work and examinations is appended to this report ; the total number of examinations was 32,130 representing an increase of approximately 4,200 on last year figures (27,885). This increase has been almost entirely due to the greater number of Kahn Tests which had to be limited to a certain extent during the war years owing to difficulties in procuring the antigen. Thanks, however, to the generous assistance of Colonels Boyd and Findlay (A.D.P., M.E.F.) a reasonable supply was received from the army throughout the war.

Staff Changes.

4 Sudanese Laboratory Assistants were trained bringing the total to 38.

The number of hospital laboratories remains the same 26.

ROUTINE.

POST MORTEMS.

29 were carried out in Khartoum Hospital of which 9 were medico-legal.

PATHOLOGICAL SPECIMENS.

The total was 690 including 131 brains for rabies.

NEOPLASMS.

254 were received of which 138 were malignant.

SITE.	Carcinoma	Sarcoma	Endothelioma	Melanoma	Mixed. Tumours	Total
Ear...	3	—	—	—	—	3
Scalp	1	—	1	—	—	2
Face	3	1	1	—	—	5
Lip	2	—	—	—	—	2
Mouth	1	—	—	—	—	1
Maxilla	2	—	—	—	—	2
Nose	3	—	—	—	—	3
Eye	4	2	—	1	—	7
Neck	1	1	—	—	—	2
Salivary Glands ...	—	—	—	—	8	8
Finger	1	—	—	1	—	2
Arm	1	1	—	1	—	3
Leg	5	3	—	1	—	9
Foot	—	1	—	8	—	9
Oesaphagus	1	—	—	—	—	1
Stomach	2	—	—	—	—	2
Large intestine ...	—	—	—	—	—	—
Rectum & Anal Canal	8	—	—	—	—	8
Liver	7	—	—	—	—	7
Kidney	1	—	—	—	—	1
Prostate	1	—	—	—	—	1
Bladder	1	—	—	—	—	1
Penis	2	—	—	—	—	2
Testis	1	—	—	—	3	4
Ovary	1	—	—	—	—	1
Uterus	7	1	—	—	—	8
Vagina	1	—	—	—	—	1
Breast	24	—	—	—	—	24
Lymphatic Glands Primary		4	—	—	—	4
Lymphatic Glands Secondaries ...	5	—	—	—	—	5
Thymus		1	—	—	—	1
Skin (site unspecified)	7	1	—	—	—	8
Spinal Cord	1	—	—	—	—	1
TOTAL ...	97	16	2	12	11	138

Comments.

Melanomata — The number (12) is more than the average (7) and as usual the majority were from the sole of the foot.

Alimentary tract — Of some interest is the occurrence of several cases of cancer in the gastro-intestinal tract, a site which is regarded as being very rare amongst Sudanese. They included 1 squamous carcinoma of the oesophagus invading the larynx, 1 stenosing adeno-carcinoma of the cardio-oesophageal junction, 1 adeno-carcinoma of the sigmoi colon and 8 cancers of the rectum and anal canal (one of these was a typical rodent ulcer arising at the anal sphincter). In addition there were, one adeno-carcinoma of the cardio-oesophageal junction causing stricture and one fibrosing adeno-carcinoma of the transverse colon in elderly Greek males. The cancer of the colon had perforated causing death from acute peritonitis.

It is doubtful whether these figures represent anything more than an increased popularity of the hospitals through the country with a larger number of surgical cases seeking admission.

Spinal Cord — The specimen classified under carcinom was a spongioblastoma multiforme, the first recorded in the Sudan.

Thymus — The tumour although histologically resembling a reticulo-sarcoma was almost certainly the type described by Ewing (Neoplastic Diseases 3rd edition p. 976) as a thymoma of the granulomatous type. It was highly malignant and had infiltrated widely all the surrounding structures. It is also the first recorded in the Sudan.

Neuro-fibromata of the rectus abdominus sheath (Desmoids) — 3 typical specimens were received ; 2 were from women in early middle age who had borne children ; details of the other are lacking. The histological criteria conform completely to Ewing's description (Neoplastic Diseases 3rd edition p.177) but unfortunately it has not been possible to obtain details of the post-operative progress of these cases. They are not included in the above list as disagreement of their malignancy exists among the leading authorities.

OTHER PATHOLOGICAL SPECIMENS.

Thyroid — While goitre appears to be not uncommon in certain localized areas of the Sudan it is very difficult to obtain exact figures as to the incidence and clinical types. Of 16 specimens of thyroid glands received, 11 were colloid goitre, of whom 3 patients showed symptoms of thyrotoxicosis, 2 were parenchymatous, of whom one showed symptoms and 3 were carcinomata. With the exception of one carcinoma and one parenchymatous goitre, all were in young or middle aged women.

Liver — Acute yellow atrophy (acute necrosis) — 15 specimens, one of which was from a case of chloroform poisoning ; the others were from cases of fever and jaundice, probably acute infective hepatitis. No case of yellow fever was reported during the year.

Tibia — A case of osteitis fibrosa occurring in the upper end (epiphysis) in a Sudanese male of 56 is the first recorded in the Sudan.

RABIES.

131 brains received of which 36 were positive for Negri bodies. They included 1 human, 28 dogs, 3 camels, 2 goats and 2 donkeys.

Rabies Vaccine — 88,925 c.cms. were issued.

SALMONELLA INFECTIONS.

(i) Isolation of *Bact. typhosum* from faeces using Leifson's selenite enrichment medium — Owing to several recent favourable reports from army laboratories in the Middle East and elsewhere a preliminary trial of this medium was carried out. The technique adopted is that as laid down by Leifson in his original article (Amer. J. of Hyg. 1936 — Vol. 23 p. 423) with slight modifications.

Technique — A small portion of the faeces is emulsified and approximately 0.1 to 0.2 c.cm. inoculated into a tube of selenite medium. After 18 to 24 hours incubation at 37°C a loopful is inoculated on to a freshly prepared plate of Wilson and Blair's Medium. In the case of urine, the centrifuged deposit is inoculated into a tube of selenite medium and the further procedure is similar to that described for faeces.

The following table shows the effect of this enrichment on the isolation of *Bact. typhosum* from convalescent patients :

Number of cases.		Direct plating on to Wilson and Blair Medium.		Selenite enrichment followed by plating on to Wilson and Blair Medium.	
		Positive	Negative	Positive	Negative
Faeces ..	50	4	46	16	34
Urines ..	50	3	47	14	36

The results are so unequivocally favourable to selenite enrichment that it has now been adopted as a routine method in the bacteriological examination of faeces and urines of all enteric cases and carriers.

(ii) Bact. paratyphosum B. as a cause of abscess in the liver.

The following case is of considerable interest owing to its great rarity, or even uniqueness, as no similar case appears to have been reported in the available literature.

The patient a Sudanese male aged 20 was admitted to Khartoum Hospital complaining of a chronic pain in the right side of the chest which had lasted for five months. There was tenderness on pressure and oedema over the lower ribs and an ill-defined mass (apparently an enlarged liver) could be felt in the right hypochondrium. Patient complained of slight evening fever but on admission the temperature was normal and it remained so throughout his stay in hospital. There were no other symptoms and his general condition appeared very good.

On liver aspiration over the centre of the oedematous area a small quantity of pus was drawn off. The pus contained numerous polymorphs and no amoebae were found. From it *Bact. paratyphosum B.* was isolated in pure culture.

After 3 weeks in hospital patient felt so fit that he insisted on going out and after several months the latest information is that he is perfectly well.

The main points of interest are (1) the production of a liver abscess in what must have been a very mild ambulatory case of paratyphoid B. infection. A search through a number of standard text books of Pathology and Clinical Medicine for the mention of this lesion was negative ; (2) the great rarity of *Bact. paratyphosum B.* in the Sudan.

(iii) Food poisoning outbreak in an R.A.F. Camp in El Fasher.

During May and June a number of cases of acute gastro-enteritis occurred among R.A.F. personnel, including seven cases which occurred within a day or two of each other. The symptoms were mild, the temperatures ranging between 100° and 102°F. for 24 to 36 hours and all had recovered completely in about 48 hours. From the faeces of two cases (sent by air to Khartoum) *Bact. paratyphosum B*, was isolated.

The faeces from the recovered cases still in Fasher as well as all the Sudanese food handlers were then sent by air for bacteriological examination. No positive results were obtained from the first group but from two faeces of the second group a salmonella organism was isolated. Its main 0 antigenic complex was VI group C. but its minor O antigens were also related to Groups D and E. It thus appears to be a new type with closest relations to *Bact. paratyphosum C.* but typing sera were not available for complete identification. The results indicate that while two of the Sudanese food handlers were salmonella carriers there was no evidence to incriminate them as a cause of the outbreak. On the other hand there can be little doubt that the outbreak originated from one of the R.A.F. personnel, either as a mild case or carrier. Subsequent enquiry elicited the fact that a short time before the main outbreak, one of the R.A.F. personnel was admitted to Fasher Hospital for a few days with similar symptoms and on recovery was transferred to Khartoum. Unfortunately it was not possible to follow him up or obtain specimens for bacteriological examination. The other point of interest was the production of a syndrome of the food poisoning type in place of the usual enteric infection. These cases lend fresh support to Savage's recent important paper (1942) on the interesting position regarded from an evolutionary standpoint, occupied by *Bact. paratyphosum B.* in the Salmonella Group.

PENICILLIN.

(i) For the first time, limited supplies of this drug became available and so afforded the opportunity for members of the laboratory staff to gain experience in the routine procedures of titration of the penicillin content of blood and other fluids and to compare the various methods advocated for titrating the potency of various batches of penicillin. A small amount of the standard penicillin was kindly furnished by Sir Henry Dale, National Institute of Medical Research, Hampstead and the standard *Staphylococcus* (Oxford H.) was obtained from the National Collection of Type Cultures, London.

Wherever possible the testing of susceptibility to the drug, of organisms isolated from patients as a preliminary to treatment, has now become a routine procedure. So far the most satisfactory general method found, has been the aerobic agar or blood agar plate culture of Fleming in which discs of the agar are cut out by a cork borer and the penicillin in suitable dilutions dropped into the holes (Med. Res. Counc. War. Memo. No. 12).

Some work was also carried out on the production of penicillinase by the two recommended organisms *B. subtilis* (6344) and Harper's coliform bacterium. The latter was found to produce a higher titre of the penicillinase.

(ii) **Susceptibility of C. diphtheriae**—*C. diphtheriae* is given in the lists as one of the susceptible organisms to penicillin but judged by the absence of references in the available recent literature, a comprehensive study of the various biochemical types and strains of this organism does not appear to have been carried out. Hence opportunity was taken during the routine isolation of *C. diphtheriae* from clinical cases and carriers to test the susceptibility of freshly isolated strains. The method employed was the agar cup as above and the medium was the standard tellurite blood agar (Horgan and Marshall) used in the Sudan for many years.

90 strains of *C. diphtheriae* were tested ; a full investigation of their biochemical types was not carried out in every case but in their colonial appearance and morphological characters all were typical *mitis* (the predominant type in the Sudan).

Results.

Of the 90 strains, 12 were completely insusceptible up to 2 units of penicillin ; the susceptibility of the remaining 78 appeared to vary considerably judged by the diameter of the zone of inhibition. In many cases the occurrence of " double zones " interfered markedly with the accuracy of the readings.

PRIMARY ANTHRAX MENINGITIS.

A case of this extremely rare condition was reported by the Medical Officer, Khartoum North. The patient was a Sudanese watchman living near Khartoum who had no contact with infected animals or animal products and as no human case of anthrax has been reported from Khartoum for many years the origin of his infection is unknown. The patient who had complained of fever of one day's duration and severe headache was on his way to hospital when he collapsed in the street and was brought to hospital in a comatose state suggestive of subarachnoid haemorrhage. He had no skin lesion, his nasopharynx was healthy and the respiratory system normal.

Immediately on admission lumbar puncture was performed and a blood stained cerebrospinal fluid under pressure was obtained. There were no pus cells but films were swarming with gram positive capsulated bacilli. In spite of penicillin treatment the patient died in deep coma the same evening. From the fluid *B. anthracis* was isolated in pure culture and the strain tested on the guinea pig proved of high virulence. The case is being published (Horgan and Tigani El Mahi—in press).

SMALLPOX AND VACCINIA.

(i) **Research**—Work on the immunological relationships of the alstrim viruses has been recommended and is still in progress. This is a continuation of the study, the preliminary investigations of which have been published (Horgan and Haseeb, J. of Hyg. 1939 Vol. 39 p. 615) but which was interrupted by the outbreak of war.

A paper was published during the year which summarized the results of a series of studies for some years on the immunogenic unity or plurality of vaccinia virus (Horgan and Haseeb—Lancet 1945 II p. 170).

(ii) **Routine Vaccine Lymph**—21 sheep were used ; the total yield of pulp was 1,106 grms. the average being 52.6 grms. per sheep. These yields are the highest yet obtained, the next best being those for 1944 (50 grms.).

Owing to the cessation of supplies of lymph to the M.E.F. and the lessened demand within the Sudan in the absence of any case of smallpox during the year the amount prepared was very much less than previous years.

Doses Issued—630,000.

SNAKE VENOM.

In May, the first specimen of the rhinoceros viper (*Bitis nasicornis*) to be recorded from the Sudan was found in Equatoria. Venom was obtained from this snake before death and as there appears to be no account of *nasicornis* venom in the literature an investigation of its toxic effects was carried out. Its lethality as measured by the subcutaneous M.L.D. in mice, was found to be less than that of the congeners *arietans*, *atropos*, *caudalis* and *gabonica*. *In vitro* tests showed that the venom was markedly proteolytic, but no haemolysin, and no coagulase were demonstrated with human blood. A haemorrhagic effect and the presence of a spreading factor were demonstrated *in vivo*. No neurotoxic action was obvious in mice, but special experiments for its demonstration were not carried out.

LEISHMANIASIS.

(i) **Chemotherapy** (A)—**Penicillin in kala-azar**—In the available literature to date there appeared to be no record of the effect of this drug in leishmaniasis and as a supply of the drug became available its action was tested on two cases of kala azar. The treatment was carried out by Dr. Mohd. Hamad Satti in Gedaref Hospital, a total of 1½ million units of penicillin being used in each case.

The result was a complete failure and there was no evidence that the slightest beneficial effect was exerted by the drug. On the contrary the condition of one patient deteriorated during treatment.

The results have been published (Horgan and Satti—Nature 1945 September 8th). These findings have been confirmed by Fulton (1945) using experimentally infected hamsters.

(B) **Treatment of kala azar with concentrated sodium antimony gluconate**—Drs. Kirk and Satti at Gedaref Hospital have continued their studies, using a concentrated solution of the pentavalent antimony (100 mgms. per c.c.). The drug was kindly supplied by Dr. C. M. Wenyon F.R.S. of the Wellcome Foundation.

The results are being published but the following is a short summary of the most recent findings supplied by Dr. Satti :

14 cases, representing all degrees of severity and including the two cases in which penicillin had failed were treated with only one death (7.1 per cent.), that is, as far as immediate results were concerned. The standard dose per patient irrespective of age or body weight was 100 mgm. intravenously, the average number of injections six and the average amount required for cure 4.0 grms. " Of these 13 provisional cures seven have been followed up for a period of six to nine months after discharge from hospital and all the evidence of a cure is regarded as satisfactory." The criteria of cure are those adopted by Kirk and Satti (Ann. Trop. Med. and Parasit. 1940 Vol. 34—181).

" The results so far obtained compare very favourably with any form of remedy hitherto tried. There is much hope that this may solve our problem of treatment of kala azar in the Sudan cutting down the period of hospitalization considerably and so reducing the expenses of feeding the patients etc., as well as relieving the congestion of hospitals in the endemic area."

(ii) **Sandflies**—Attempts were made this year to resume investigations into the aetiology of leishmaniasis which were interrupted in 1939 and have since been in abeyance. Dr. Kirk visited the Kapoeta endemic area in April and May, in the season when this district is accessible, but found that this was not a suitable time of the year for epidemiological investigations. However, collections of sandflies obtained there include several new records for the Sudan, where 26 named forms are now known as compared with 13 in 1939. No less than 7 of the new additions to the list belong to the sub-genus *Phlebotomus* s. restr., the members of which are as a rule antropophagous and include the vectors of leishmaniasis and sandfly fever. Three members of the *sergenti* group were found in the Kapoeta area, although this group has not previously been encountered anywhere in the Sudan.

The identification of the numerous specimens obtained has entailed extensive studies on the taxonomy of *Phlebotomus*. The literature on this subject is copious but scattered, and during this work it was recognised that there was need for a collected, up to date account of the taxonomy of the Ethiopian species. The compilation of such a work was therefore undertaken during the course of the year and it is now in the press (Kirk and Lewis, 1946, Ann. Trop. Med. and Parasitol). It is a great pleasure to record appreciation of the generous help (and pleasant correspondence) which, in the course of these studies, has been received from Dr. L. Parrot, of the Institut Pasteur D'Algerie, from the Malaria Survey of India, and from the Liverpool School of Tropical Medicine.

Attention has also been given to the microclimatic conditions inhabited by sandflies in the Sudan plains. The success of these delicate insects in the hot arid conditions of the Sudan appears to be due in large measure to their exploitation of a vast subterranean environment consisting of holes and cracks in the ground, particularly animal burrows and cotton-soil cracks. Both those situations are free from the extremes of temperature and relative humidity which occur above ground. The temperature remains almost constant throughout the year, at 27°C, and the air is practically saturated with moisture, giving the optimum climatic conditions for sandflies.

(iii) Experimental infection of Mystromys albicaudatus — Attempts to keep hamsters as experimental animals have not been successful in the conditions in Khartoum. Mr. D. H. S. Davis of the Union Health Department (South Africa) kindly supplied some *Mystromys albicaudatus* (the indigenous African representative of the family *Cricetinae*) which he had found bred well in the laboratory in Johannesburg. Although the *Mystromys* have not been able to breed in Khartoum, they seem more suited to the conditions here than hamsters, and live longer. Attempts to infect them with kala azar show they are susceptible, but not constantly as hamsters are. As was noted in the Sudan by Archibald many years ago in the case of gerbils, successful infection in *Mystromys* runs a chronic course ; the animals remain in good condition, may even put on weight and splenomegaly may be absent, in spite of an intense infection. The histopathological changes of the tissue reaction to infection are singularly clear in these animals, and correspond with those described by Meleney (1925, Amer. J. Path. Vol. 1 — 147) in hamsters ; namely endothelial proliferation and the development of islands of clasmatocyte tissue, which in paraffin sections, look almost like neoplastic proliferation.

Summary of Routine Examinations

Kahn Tests	17,277
Widal Reactions	1,336
Weil-Felix Reactions	25
Blood Cultures	770
Blood Films	2,685
Blood Counts (Total)	131
Cerebrospinal Fluids	89
Medico-Legal Tests (Blood Stains)	13
Biochemical Tests	242
Autogenous Vaccines	4
Pathological Histology (including brains for Rabies)	690
Faeces	2,790
Urines	1,419
Throat and Nose Swabs : *C. diphtheriae* positive	339
,, ,, ,, ,, ,, negative	3,468
Virulence Test (*C. diphtheriae*)	5
Sputa : *M. tuberculosis* positive	36
,, ,, negative	118
Spleen smears (Kala azar positive)	7
General Bacteriological Examinations	616
Water Examinations	70
Total Examinations... —	32,130

Summary of Faeces Examination.

Bact. dysenteriae Flexner V—Z series	135
,, ,, Sonne	4
,, *Shigae*	78
,, *ambiguum* (Schmitz)	29
,, *typhosum*	66
Bact. paratyphosum A.	1
Bact. paratyphosum B.	5
Salmonella "Group C"	2
Entamoeba histolytica...	52
Ova Present	42
Negative	2,376

Summary of Urine Examination.

Bact. typhosum...	30
Bact. paratyphosum A...	1
Ova present	7
Negative	1,381

Summary of Blood Films

Malaria :—	
Benign Tertian	28
Subtertian	332
Quartan	1
Double infection (BT—ST)	1
Relapsing Fever	569
Negative	1,754

Summary of Widal Reactions.

Bact. typhosum	194
Bact. paratyphosum A	2
Bact. paratyphosum B	
Br. melitensis	85
Negative	1,054

Summary of Blood Cultures.

Bact. typhosum isolated	65
Bact. paratyphosum A isolated	6
Bact. paratyphosum B isolated	2
Br. melitensis isolated	1
Strep pyogenes isolated	37
Other organisms isolated	35
Negative	624

Summary of Weil–Felix Reactions

Negative	25

Vaccines Issued during 1945.

T.A.B.	16,250 cc.
Anti-Rabic	88.925 cc.
Cholera	9,300 cc.
Staphylococcus	400 cc.
Vaccine Lymph	630.000 units

CHAPTER IX.

MEDICAL ENTOMOLOGY.

MR. D. J. LEWIS.

GENERAL.

The Medical Entomologist visited Juba, Yei, Meridi, Wadi Halfa, Singa, Suki Roseires, Sennar, the Jebel Auliya Reservoir, Port Sudan, Suakin and Hawata.

He also went to Egypt and saw the work of the Gambiae Eradication Service of the Egyptian Ministry of Health. The Director of the Service and the Field Director at Assiut arranged very interesting tours of the Assiut and Aswan areas. The work had reached the stage when control had been stopped for several months and the staff were employed in searching for *Anopheles gambiae* to see if eradication had been achieved. The Medical Entomologist also saw the work of the Bilharzia Eradication Service near Cairo.

Collections received for identification numbered 84. Some species were identified at tho Imperial Institute of Entomology.

Several employees of the Public Health Department were trained in mosquito control and some routine tests of insecticides were made on *Aedes aegypti.*

The modeller from the Graphic Museum spent a week at Wad Medani making a model of *Aedes aegypti.*

In the past much time and material have been wasted by the lack of a reliable microscope mounting medium for insects which is quick in use and suitable for the Sudan climate. A supply of the new polyvinyl alcohol-lacto-phenol medium was received from Professor P. A. Buxton, F.R.S., and proved very useful.

SANDFLIES.

Work on the distribution and bionomics of sandflies has been continued in collaboration with Dr. R. Kirk ; 31 species and varieties have now been found in the Sudan, including several undescribed forms, and a paper bringing the results of the survey up to date has been prepared for publication.

ANOPHELINE MOSQUITOES.

The Gezira.

The principal method of controlling *Anopheles gambiae* in the irrigated area is by bailing water from field channels. This destroys large numbers of larvae but control is only partial. In the area surrounding the Research Farm Paris green has been used for some years, and recently the use of D.D.T. in malariol on breeding places and residual D.D.T. in houses was started with a view to extending their use and that of Paris green to other experimental areas when regular supplies become available.

The Jebel Auliya Reservoir.

It was found that the creeping grass, *Vossia cuspidata,* had formed large swamps as far north as Shabasha and that *Vetiveria nigritana* had covered large areas in the sedge swamps. No papyrus was seen north of Kosti bridge and it appears that, as a result of the dam, the swamps protected by papyrus are a thing of the past in the Kosti-Dueim area.

In September 25,000 *Gambusia* were released in the Kosti swamp. They rapidly increased in numbers and exercised partial control. A similar results could probably be achieved by introducing a smaller number.

Collections of mosquitoes on a man and a calf indicated that *A. rufipes* and *A. pharoensis* have no marked preference for one rather than the other.

The Upper Blue Nile.

A further visit to Singa in the rains confirmed the conclusion that control of larvae in the great areas of flooded forests is so difficult that control of *A. gambiae* should for the present be attempted mainly by spraying houses with residual D.D.T.

The Wadi Halfa Area.

Control of *A. gambiae* has been very good but the finding of a few larvae indicates that eradication has not been achieved. Recommendations were made on methods of control.

Equatoria.

Lebistes reticulatus were introduced into the stream at Kagelu.

Upper Nile Province.

Comparatively little is known about the bionomics of *Anopheles squamosus* and it is of interest to note that a collection of 140 mosquitoes made between Nasir and Akobo in September by Dr. J. F. E. Bloss contained 99 of this species.

CULICINE MOSQUITOES.

The supervision of the work of the Headquarters Aedes Control Unit was continued but this was handed over to the Chief Public Health Inspector at the end of the year.

Monthly summaries of returns of the control of *Aedes aegypti* were prepared as usual.

Uranotaenia ornata was found for the first time in the Sudan, at Wau by Mohamed Eff. Osman El Zubeir.

Culex antennatus was found to be the commonest man-biting mosquito in the Bor-Shambe area in July. As in Kenya it appears to prefer cattle to man.

An adult of *Culex arbieeni* Salem was obtained by Dr. P. H. Abbott in the Marra Mountains and the presence of this species confirmed.

SIMULIIDAE.

Simulium griseicolle was found to have a wide range, specimens being obtained at Juba and Hawata, far from the well-known areas on the main Nile.

TABANDIAE.

Specimens collected in the Upper Nile Province by Mr. J. K. Thomson included *Tabanus thoracinus*, *T. par* and *T. fuscipes*.

NON-BITING MUSCOID FLIES.

At Port Sudan and Suakin it was found that *Musca domestica vicina* could breed in trench latrines with well constructed walls and roofs. Experience in many areas has shown the necessity of providing public latrines with attendants to prevent access of house flies.

Breeding flies from carcases at Wad Medani showed that in the dry season nearly all these flies were *Chrysomyia albiceps Wied.* and *Wohlfahrtia nuba Wied.* In the rains a new species of *Sarcophaga* and a few other flies were bred.

Rotting cotton seed was found to be a very convenient bait for fly traps.

Sarcophaga inaequalis Aust., *S. haemorhoidalis* Fln. and *S. hirtipes* Wied. were found breeding in human faeces at Wad Medani.

TSETSE FLIES.

A visit was paid to the Yei area and recommendations made on the control of *Glossina palpalis* with particular reference to the recent findings in Uganda on the effect of sizes and shapes of protective clearings.

MITES.

Mites, *Liponyssus* sp., were found attacking man at Dilling and sent for identification by Dr. M. R. Farid.

PUBLICATIONS.

The following papers have been published since those noted in the last report :

Lewis, D. J. (1944). Observations on *Anopheles gambiae* and other mosquitoes in the Wadi Halfa area : Trans. Roy. Soc. Trop. Med. and Hyg. 38, 215-229.

.... (1945). Observations on the distribution and taxonomy of Culicidae (Diptera) in the Sudan. Tran. Roy. Entom. Soc. Lond., 95, 1-24.

The following papers, not emanating from the Section of Medical Entomology, should be noted :

Bloss, J. F. E. (1945). The Meridi outbreak of sleeping sickness. Trans. Roy. Soc. Trop. Med. and Hyg., 39, 59-76.

.... (1945). The tsetse fly in the Sudan. Sudan Notes and Records, 26, 139-156.

Hunt, A. R. and *Bloss, J. F. E.* (1945). Tsetse fly control and sleeping sickness in the Sudan. Trans. Roy. Soc. Trop. Med. and Hyg., 39, 43-58.

CHAPTER X.

THE WELLCOME CHEMICAL LABORATORIES.

DR. A. J. HENRY.

SECTION I — INTRODUCTORY

1. Introduction.

This bulletin forms the Technical Report of the Sudan Government Analyst for 1945.

The number of samples examined during the year was 766 compared with 923 in 1944 and 703 in 1943, the decrease as compared with 1944 being fairly uniformly distributed over the various types of samples examined. The Sudan Medical Service makes by far the most use of these laboratories, and accounts for half of the total samples received and for substantially more than half of the total available time. Private firms have made steadily increasing use of these laboratories during recent years.

During the year an intensive effort has been made to clear up finally the question of the nature of the photochemical decomposition of stilbamidine, and this object has now been very largely achieved. Each new advance has, however, revealed fresh problems connected with this interesting drug, upon which it is hoped to carry out further work in 1946. The examination of seed oils of potential economic, or of academic, interest has been continued with an investigation of the seed oils of some Sudan Caesalpinioideae.

The presentation of this report is closely similar to that of the previous year.

2. Summary of Examinations made.

The following is a summary of the examinations made in the laboratories during the year under review :—

	1945	1944
(a) WATERS.		
Potable	78	76
Boiler	1	7
	79	83
(b) FOODSTUFFS.		
Milk	77	50
Alcoholic beverages	14	15
Miscellaneous Foods	189	234
	280	299
(c) MEDICO-LEGAL AND MISCELLANEOUS DRUGS.		
Pathological	26	71
Toxicological	37	32
Miscellaneous Drugs	65	44
	128	147
(d) MINERALOGICAL.		
Coals	43	71
Mineral Oils	8	14
Various Minerals	23	30
	74	115
MISCELLANEOUS	205	279
TOTAL	766	923

3. The table below gives the number of samples submitted by various Government Departments and other sources :—

Source.	No. of samples submitted
Agriculture and Forests Department	9
Research Division of A. and F.	23
Customs Department	51
Education Department	13
Sudan Medical Service	361
Police	7
Provinces	11
Public Works Department	67
Stores and Ordnance Department	7
Sudan Railways	71
Veterinary Service	8
War Supply Department	5
British Army	2
Sudan Defence Force	1
Egyptian Irrigation	1
Private Firms	123

4. Publications.

During the year the following were published or submitted for publication :—

"Report of the Government Analyst for 1944."

"The Bromination of 4 : 4″—Diamidino diphenoxy—propane and of 4 : 4″—Diamidinostilbene," by A. J. Henry (in the press).

„ A Simple Apparatus for Handling Standard Solutions of Bromine in Potassium Bromide," by A. J. Henry (Analyst, 1945, 70, 259).

SECTION II — WATERS.

	1945	1944
Tokar Water Supply	40	36
Railways (Softeners)	1	10
Miscellaneous Waters	38	35

5. The examination of water samples during the year has been confined almost entirely to Tokar, where a number of new wells has been opened up, and to miscellaneous samples received from all parts of the country. No samples were received from Port Sudan and El Obeid Supplies.

The new wells at Tokar have all proved to be typical Red Sea Hills Waters, with total solids from 1400-2100 ppm., hardness 40-70 degrees and sulphate 200-400 ppm. The average of the High Level Tank for the year was 1877 ppm. total solids and 48 degrees of hardness.

6. Amongst the miscellaneous samples the following were of interest :—

(a) Two samples from Nahud, reputed to have caused fatalities amongst cattle, were very hard and saline, and contained 800 ppm. of nitrate.

(b) A sample from Roseires Civil Hospital contained 200 ppm. of sodium bicarbonate and 435 ppm. of sulphate.

(c) A water from Um Harut contained 1 ppm. of fluorine, a normal figure.

(d) Three waters from Kondowa were very hard (100 deg.) and very saline (3500 ppm.).

(e) A water from Dueim contained 1900 ppm. of sodium bicarbonate, typical of this district.

SECTION III—FOODSTUFFS.

	1945	1944
Milks	77	50
Alcoholic Beverages	14	15
Other Foodstuffs	189	234

7. Milks.

Of 62 samples submitted by the Public Health authorities 27 were below the legal standard ; one contained 40 per cent. of added water ; and of 10 submitted by the School of Agriculture 5 were below standard.

8. Alcoholic Beverages.

The following points are of interest :—

(a) Brandy which had been stored in petrol tins contained considerable iron and tin in suspension and in solution.

(b) A locally made liquor, known as " Duma " contained 5.5 per cent. of alcohol by volume.

(c) Six samples of rum, reputed to have caused blindness on account of the presence of methyl alcohol, were found to be free of methyl alcohol, isopropyl alcohol and acetone.

9. Miscellaneous Foodstuffs.

These include grains and flours, sesame oils, butters, margarines, etc.

(a) *Grains and Flours.* The majority of these were dura and dukhn flours received from S.D.F. Supplies, and a high proportion were found to contain an excess of mineral impurities.

(b) *Sesame Oils.* Of 15 samples examined all were genuine, but one was heavily contaminated with the mycelium of a fungus and was condemned.

(c) *Butter Fats.* Of 8 examined one was adulterated with sesame oil and was very acid and rancid.

(d) *Margarines.* Six samples examined were all found to have high acidity.

(e) *Others.* These include a variety of foodstuffs, none of which requires special comment.

SECTION IV — MEDICOLEGAL.

The one hundred and twenty eight samples included in this category are subdivided as follows :—

Pathological	26
Toxicological	37
Miscellaneous Drugs	65

10. Pathological.

Ten of these were associated with eight separate cases of suspected poisoning, as follows :—

Case.	Specimen.	Findings.
I	1 Vomit	Datura Alkaloid.
II	1 Stool	Negative.
III	1 Stomach contents	Negative.
IV	1 Stool	Negative.
V	2 Stomach and Stomach Contents	Negative.
VI	1 Stomach Content	Negative
VII	2 Vomit and Stomach Contents	Atropine, Hyoscyamine or Hyoscine.
VIII	1 Urine for atropaceous alkaloid	Negative.

The remaining samples include stools (7) for split and unsplit fat; urines (2) for chloride; and seven bloods, for calcium (4), non-protein nitrogen (2) and mepacrine (1).

11. Toxicological.

The positive findings were:—

(a) A specimen from Juba consisted of ground Mylabris beetles, containing cantharidin.

(b) Corned Beef sandwiches contained lead, tin and zinc.

(c) Salted fish contained lead.

(d) A specimen of a fruit (nut), associated with case VII, was probably a species of Kola, and contained caffeine.

(e) A sample of sherry, concerned in a case of suspected drugging, had a high alcohol content, and had probably been fortified with "araki aish."

(f) A sample of suspected poison bait contained arsenic.

(g) One sample of hashish was identified.

12. Miscellaneous Drugs.

Amongst the 65 samples here included the following points are of interest:—

(a) A sample of Hyoscyamus contained only 0.64 per cent. of hyoscyamus Alkaloids.

(b) Three samples of cocaine hydrochloride had been adulterated with varying quantities of basic bismuth carbonate.

(c) Of 12 samples of ethyl morphine hydrochloride one had been tampered with.

(d) Ten samples of confiscated quinine bisculphate failed to conform with B.P. Standards of purity. One contained considerable magnesium sulphate and one contained sodium and potassium chloride and sulphate.

(e) Three samples of cattle plague vaccine were examined for genuineness and adulteration.

(f) A rat poison was barium carbonate.

(g) A sample of D.D.T. "Residue" was shown to be normal.

(h) 12 samples of rectified spirit were examined for alcohol content.

SECTION V—MINERALOGICAL.

13. Coals.

Forty three samples representing 12 cargoes, examined for the Railways, averaged 12,896 B.Th.U., and 11.4 per cent. ash, as compared with 12,940 B.Th.U. and 11.9 per cent. ash in 1944.

14. Mineral Oils.

Only seven samples, of various types, were examined, none of which calls for comment.

15. Various Minerals.

The twenty three samples so classified include the following:—

(a) A mineral thought to be columbite, was shown most probably to be columbite.

(b) Two samples of mortar, from a newly erected building which had cracked badly, were found to be heavily deficient in lime.

(c) Aluminium cooking vessels made from scrap aeroplane metal were passed as satisfactory for normal use.

(d) Four white metals and one lead were examined for the Railways.

(e) Of five limestones examined three were high calcium limestones and two were dolomitic.

(f) A sample of asbestos, mined near Juba, was of suitable quality for use as a boiler insulator.

SECTION VI — MISCELLANEOUS.

16. Oil Seeds.

The thirteen samples examined varied in oil content from 20.8 per cent. to 27.9 per cent. the average being 25.3 per cent. Forty four samples of grain were examined for dirt content.

17. Methylated Spirits.

Forty samples were examined for the Customs Department, as compared with 55 in 1944.

18. Spoilage.

Twenty six damaged articles were received. The findings were : sea water, 9 ; probably sea water, 6 ; mineral acid, 2 ; mineral oil, 1.

19. Soaps.

Of the 21 samples examined many were of very inferior quality through having been manufactured under conditions where adequate control of materials and charge could not be expected. It is not sufficiently widely recognised that the satisfactory manufacture of soap is a process requiring much experience and adequate analytical control.

20. Charcoal Briquettes.

Fifteen samples of ovoids were examined for the Soil Chemist.

21. Perfumes.

Thirteen samples, submitted by the Customs Department, were not considered of such a nature as to be unusable for the manufacture of alcoholic beverages.

22. Sulphur Dioxide.

Heavy corrosion in refrigerators resulted in seven cylinders of sulphur dioxide being submitted for examination. In all cases the sulphur dioxide was shown to have been inadequately dried before liquefaction, hence the corrosivity of the liquid.

23. Others.

These include four abavits, seven bags for breaking strength, three matches, two suspected explosives and two samples of clothing concerned in a fatal car accident.

24. Stilbamidine.

Much effort has been concentrated on various aspects of this subject during the year, and important results have been obtained. The majority of this work has now been written up in a series of papers which have been submitted for publication. These include a description of the apparatus designed for handling standard solutions of bromine in potassium bromide, which has proved of great value in elucidating the photochemical changes with stilbamidine undergoes ; and an account of various phenomena associated with the bromination of stilbamidine and propamidine.

An interesting point which was described was the spontaneous reversal of bromination of stilbamidine in solution, and a possible chemotherapeutic use of this phenomenom was mentioned. Preliminary experiments have been carried out with sheep injected with brominated stilbamidine, and there is little doubt that reversal of bromination occurs *in vivo* to a very significant extent. It had been hoped that the brominated molecule might be able to penetrate into the cerebrospinal system, and there debrominate to stilbamidine which could then attack trypanosomes in the cerebral system, so exerting an action in the late stages of trypanosomiasis. No trace of stilbamidine could, however, be detected in the cerebrospinal fluid three and a half hours after the injection.

The principal changes which stilbamidine undergoes on irradiation have been elucidated, and there is no reasonable doubt that on isolation *cis-trans*-isomerisation and dimerisation occur, that reversal of dimerisation is effected by short ultraviolet waves and that *cis* stilbamidine has no tendency to dimerise except indirectly via the *trans*-compound. An account of these findings has been submitted for publication.

Every fresh advance made in these investigations on stilbamidine has revealed a fresh avenue well worth following up. One such line is the investigation of the rate of excretion of dimerised stilbamidine after intravenous injection. This may throw light on the cause of the delayed toxic action which this compound has on man.

25. The Seed Oils of some Caesalpinioideae.

The oils contained in the seeds of several members of this sub-family of the Leguminosae have been investigated and the results submitted for publication. These oils have been found to contain high proportions of the high molecular weight saturated fatty acids, just as do the papilionatae and the mimosoidea, the other two sub-families of the leguminosae.

26. Camphor.

No further investigational work on this subject was carried out during the year, as the growing of the plant was, for various reasons, being discontinued. The distillation of the available leaf was, however, carried out, and some 300 lbs. of camphor produced for use by the Sudan Medical Service.

27. Desoxycholic Acid.

Some points of interest have arisen during the preparation of desoxycholic acid from ox bile for use in the Stack Medical Research Laboratories. The desoxycholic acid content of the bile can vary very considerably, and in consequence widely different yields of the acid result. Also the amount of silicic acid present in the bile can vary quite widely.

28. Cocaine Hydrochloride.

Work has been carried out on the effect of temperature on the chromium trioxide test for cocaine as described in the B.P. (1936). It has been shown that satisfactory results cannot be obtained if the temperature is above about 30°C., a temperature which is frequently exceeded in this country. The test as described in the U.S.P., using 2 per cent. cocaine hydrochloride and 5 per cent. chromium trioxide, gives satisfactory results at temperatures even as high as 50°C.

CHAPTER XI.

THE KITCHENER SCHOOL OF MEDICINE.

DR. J. S. ALDRIDGE.

GENERAL.

At the end of 1944, which was the end of the 21st Academic Year of the School, Mr. Max Page, C.B., D.S.O., M.S., F.R.C.S., inspected the School as Visitor on behalf of the Royal Colleges and reported to the Committee of Management of the Royal Colleges of Physicians and Surgeons. Following this report the following have been approved by both the Royal Colleges.

The recognition of the Kitchener School of Medicine, Khartoum, will be continued for a further two years from the 1st January, 1945.

Selected graduates of the School will be admissible to the examinations for the several postgraduates diplomas granted jointly by the Royal Colleges on complying with the conditions of the respective regulations.

The Royal College of Physicians of London will consider applications by graduates of the Kitchener School of Medicine for admission to their Membership Examination and the Royal College of Surgeons will admit specially selected graduates of the Kitchener School of Medicine to their Fellowship Examination under the regulations of their College.

It is regretted to have to report that Dr. El Nur Shams El Din died at Wad Medani following an accident while playing polo. Dr. El Nur was one of the first graduates to obtain a diploma of the School in 1928. He joined the Sudan Medical Service and resigned in 1944 for private practice.

El Sayed Sir Ali El Mirghani Pasha, K.C.M.G., K.C.V.O., presented the School with a cheque for £E. 50 for the purchase of books for the library.

The course remains the same as in 1944 eighteen months at the School of Science studying Biology, Chemistry and Physics, the two years at the Medical School for Anatomy, Physiology, Pharmacology and Parasitology and the remaining two and a half years in clinical subjects and hospital practice. Following this course there is a probationary period of two years when the graduates hold resident appointments before leaving the supervision of the School to take up posts in the provinces.

Number of Medical Students :

SCHOOL OF SCIENCE :	January to May	7
SCHOOL OF MEDICINE :	Preclinical May to December 5 from School of Science Medical Class 1 from Teachers' Training Class	6
	Junior Clinical	7
	Senior Clinical	9
	TOTAL	29

PROGRESS OF CLASSES.

The intake to the School of Medicine was disappointing, only five candidates applying for the Medical Class at the School of Science, and one other who transferred from the Teachers' Training Section of the Gordon Memorial College, a total of six. Of these one failed his examination in Organic Chemistry and the class in Anatomy and Physiology is now only five. This is a very uneconomical number to have in a class.

The candidates for the final examinations were all successful.

New courses added during the year were Nutrition 10 periods, Social Medicine 15 periods and Anaesthetics 15 periods.

The clinical society (President, Yousif Shibeika ; Secretary, Taha Osman Balleya) met monthly and the meetings were well attended.

All students were welcomed at the monthly meetings of the Sudan Branch of the British Medical Association.

PROFESSIONAL EXAMINATIONS HELD.

School of Science, Gordon Memorial College.

May	Chemistry. Physics. Biology.

School of Medicine.

May	Pharmacology.
October	Special Examination in Pharmacology.
December	Organic Chemistry.
December	Medicine, Surgery, Obstetrics and Gynaecology and Special Subjects.

School of Science.

May	Examinations in Chemistry, Physics and Biology.

Seven candidates were examined in Chemistry, Physics and Biology and five reached the required standard and were allowed to proceed to the School of Medicine.

The examiners were :—

Dr. A. J. Henry, Ph.D., in Chemistry.
Mr. A. W. Ireland, B.Sc., in Physics.
Dr. R. Kirk, M.D., B.Sc., in Zoology.
Mr. L. S. Cobley, B.Sc., in Botany.

Selection.

Following these examinations the following were accepted for training in the Kitchener School of Medicine and will proceed to the study of subjects in the second professional examinations :—

Louis Abdou Tadros.
Abdel Gadir Ginawi
Abdel Bari Mutwakil.
Dawood Ahmed Idris
Mustafa El Sayed
Osman Modawi

School of Medicine.

May Examination in Pharmacology.
Seven candidates were examined in Pharmacology of whom five reached the required standard and two were referred for three months.

The examiner was Dr. A. Cruickshank, O.B.E., M.D.

October Special Examination in Pharmacology.

Two candidates were examined in Pharmacology and both reached the required standard.

The examiner was Dr. R. M. Buchanan, M.D., D.T.M. & H.

December. Examination in Organic Chemistry.

Six candidates were examined in Organic Chemistry of whom five reached the required standard and one was asked to discontinue his studies in Medicine.

The examiner was Dr. A. J. Henry, Ph.D.

December-January Final Professional Examinations.

Nine candidates presented themselves for the Final Examinations in Medicine, Surgery, Obstetrics and Gynaecology and Special Subjects. All reached the required standard.

The examiners were :—

Brigadier N. S. Plummer, M.D., F.R.C.P., Consulting Physician to the Middle East Forces and Physician on the Staff of Charing Cross Hospital, London, in Medicine.

Mr. E. O. D. C. Grattan, F.R.C.S., in Surgery.

Dr. Eardley Holland, M.D., F.R.C.S., F.R.C.P., F.R.C.O.G., President of the Royal College of Obstetricians and Gynaecologists.

Dr. Alice Muir Leach, M.B., Ch.B., B.A.O., in Obstetrics and Gynaecology.

GRANT OF DIPLOMAS FOLLOWING FINAL EXAMINATIONS.

At a ceremony at the Palace His Excellency the Governor-General personally presented diplomas to the candidates who had been successful in their final professional examinations.

These were in order of merit :—

Mohammed El Hassan Abu Bakr.
Tahir Abdel Rahman Mahmoud.
Abdullahi Sid Ahmed Goreish.
Taha Osman Balleya.
Fatah El Rahman Abdel Gadir.
Yousif Dafalla Shibeika.
El Nur Abdel Magid Idris.
Ismail Amin Nabri.
Mahmoud Mohamed Hassan.

SCHOOL PRIZES.

The following prizes were awarded :—

Pharmacology Prize—Hamadnallah El Amin.
King Farouk's Prize in Ophthalmology—Mahmoud Mohamed Hassan.
Jackson Prize in Medicine—Mohamed El Hassan Abu Bakr.
Waterfield Prize in Surgery—Tahir Abdel Rahman Mahmoud.
Jackson Prize in Obstetrics and Gynaecology—Abdullahi Sid Ahmed Goreish.

VISITOR TO ROYAL COLLEGES OF PHYSICIANS AND SURGEONS.

The final examinations were carried out under the supervision of the " Visitor " Surgeon Rear-Admiral Cecil P. G. Wakeley, C.B., D.Sc., F.R.C.S., F.R.S.E., F.Z.S., F.A.C.S., F.R.A.C.S., a Member of the Council of the Royal College of Surgeons of England, a Member of the General Medical Council and Senior Consulting Surgeon to the Royal Navy.

Surgeon Rear-Admiral Wakeley saw all aspects of the work of the School and visited all the establishments used in educating the Medical Students. These included the Hospitals of Khartoum and Omdurman, the Graphic and the Pathology Museums, the Gordon Memorial College, the Stack Laboratories and the Hostel etc. His report will be made to the Committee of Management of the Royal Colleges of Physicians and Surgeons.

POSTGRADUATE COURSE.

No postgraduate course was held during the year.

TEACHING STAFF.

The following were appointed :—
Dr. R. M. Buchanan, Lecturer in Anaesthetics
Dr. N. L. Corkill, Lecturer in Social Medicine and Nutrition
Dr. Alice Muir Leach, Lecturer in Diseases of Children.

ADMINISTRATION.

Dr. E. D. Pridie, C.M.G., D.S.O., O.B.E., Chairman of the School Council resigned on retirement from the Sudan and Dr. A. E. Lorenzen, D.P.H., was appointed in his place.

Mr. J. A. Smith and Mr. G. N. Morhig, O.B.E., resigned from membership of the General Board.

Mr. R. V. Low and Mustafa Eff. Abu El Ela were appointed by His Excellency the Governor-General's Council as members of the General Board.

Mr. G. M. Hancock, O.B.E., resigned as Secretary of the General Board and Executive Committee and Mr. J. S. Owen was elected.

LIBRARY.

Forty eight new books were added to the library which now contains 1,600 volumes. During the year 510 books were lent to civil and army practitioners and students.

PATHOLOGICAL MUSEUM.

The museum now contains 360 mounted specimens and a large number of unmounted specimens kept in special containers. 32 mounted specimens were added in the year. Mr. A. Drysdale since 1942 has prepared all the new specimens by Wentworth's method which he has found to be very successful.

GRAPHIC MUSEUM.

This contains 51 sections and in the grounds exhibitions of rural sanitation. Propaganda models, posters and exhibits were sent to health centres and agricultural shows. The Museum is open to the public and 3069 persons recorded visits during the year.

Dr. A. E. Lorenzen, D.P.H., resigned as Curator of the Museum and Dr. N. L. Corkill, M.M., M.D., was appointed in his place.

STUDENTS' HOSTEL.

Redecoration of the hostel was carried out during the year both of building and furniture.

HEALTH.

All students are examined annually and are X-rayed and tuberculin tested before commencing clinical work. No serious illness was encountered during the year.

GAMES.

Facilities for tennis, football and netball are provided in the School grounds.

CHAPTER XII.

THE S.M.S. SCHOOL OF HYGIENE

This school is accommodated in a room in the Khartoum Public Health Department's buildings and a room in the S.M.S. Graphic Museum and has the use of a laboratory by the courtesy of the Kitchener School of Medicine. The S.M.S. Graphic Museum provides certain training matter and practical work is carried out in Khartoum City and the Province Rural District. There is a hostel for 6 students adjoining the Khartoum Public Health Department.

The staff of the school consists of the Principal who is a British Public Health Inspector and who has to assist him a Sudanese Public Health Officer. Four Boards of Studies in association with the School control the syllabus and curriculum, the selection of candidates, the appointment of teachers and examiners and the examinations, in each of the four categories of staff, Public Health Officers (for certificates of the Royal Sanitary Institute), Sanitary Overseers, House-to-house Inspectors and Mosquito-men though this last group will continue for the most part to be trained in their own areas ; these Boards report to the Director, Sudan Medical Service and in each case, the Chairman is the Assistant Director, Public Health and the Secretary, the Principal of the School.

The basis of education on which training is super-imposed is that of the 4th Year Intermediate School standard, meaning a work-a-day knowledge of English, and the desirable transition is from House-to-house Inspector, to Sanitary Overseer. The better educated, cleverer and more ambitious and successful Sanitary Overseers may progress to selection for the course for Public Health Officers for which category also, the door is open to candidates of higher basic education, without previous practical experience in hygiene. It is hoped to raise the standard of education and training of mosquito-men also and give them the prospect of competing for the higher categories, for the mosquito-man with the advent of modern insecticides and methods is now required to be something of a skilled technician and no longer merely an intelligent labourer.

Mosquito-men.

These men are trained by Sanitary Overseers and Public Health Officers in the localities in which they are employed. A more detailed and formal course of training and examination is under preparation. All such staff are Sudan Medical Service personnel.

House-to-house Inspectors.

These are employees of local government authorities and training is carried out locally by the senior public health official (at present central government staff) in the area. The subjects taught are on a curriculum prepared by the Principal of the School of Hygiene and cover : personal hygiene, inspection procedure, housing, food preparation and manufacture, disposal of waste matter, entomology and its applications, prevention of disease, and sanitary law.

Sanitary Overseers.

These are Sudan Medical Service officials and candidates may be drawn from Mosquito-men House-to-house Inspectors or others. The training course lasts one year, The curriculum is that of the House-to-house Inspectors in more detail and extended to include also :— control of foodstuffs, water-supplies, hygiene of schools, communicable diseases, methods of disinfection, village sanitation, office routine and storekeeping.

Public Health Officers.

Students are drawn from selected Sanitary Overseers and others by record of service, examination and interview. The course is of three years and the qualifying examination is that of the Royal Sanitary Institute.

The curriculum is as follows :— 1st. year : General science, arithmetic, geometry and English at the Omdurman Technical School ; 2nd year : entomology and pest control, helminthology, protozoology bacteriology, water-supplies, disposal of waste matter ; and 3rd year : foodstuffs, nutrition, meat inspection, milk, food preparation and manufacture, housing, urban and rural planning, communicable diseases, control of disease, school health, prison health, industrial health, quarantine, air port and sea port control, vital statistics, and sanitary law.

PROGRESS DURING 1945

During the year 7 students were under training. At a final examination for the certificate of Sanitary Officer of the Royal Sanitary Institute, the three candidates passed.

During the year 12 House-to-house Inspectors were trained and six students from Saoudi Arabia commenced a modified Sanitary overseers' course and proved a keen and promising class. Classes averaging 28 from the Medical Assistants Training Course in Omdurman received instruction four days weekly throughout the year and sixty policemen from the Police Training School Omdurman were given a three weeks' course of lectures and demonstrations.

CHAPTER XIII.

THE OMDURMAN MIDWIVES SCHOOL

The School was instituted in 1921 and since that year has trained 454 midwives of whom 50 have died, 16 have had their licences cancelled for infirmity and 46 have been struck off the register for offences, resignation or inefficiency. Of the remaining 343, 314 are practising District Midwives, 27 are Trained Nurses and 2, who are also Trained Nurses, are employed as Health Visitors. Three of those struck off the register have been re-instated.

The School has a British Principal, a British Charge Sister as assistant and a teaching staff or establishment of 8 Sudanese midwives. In addition there is a Sudanese Health Visitor, a Woman Vaccinator and a District Registrar, apart from menial staff.

During 1945, among midwives there were 3 deaths, 1 had a licence cancelled on medical grounds, 7 were struck off the register or resigned and 1 was re-instated after a refresher course. During the year certificates were issued on the results of the examination at the end of the course to 23 new midwives. Pupils accepted and in training for the 1946 season are 25. In addition to the normal training course in 1945, four refresher courses to individual women were given in the school, and six in the provinces. Further, special two-months' courses were given to 7 2nd class midwives unsuitable for full training, by staff midwives in the villages of the areas concerned, in which dispensaries were situated. These 7 were then licensed.

The present distribution of 1st class, that is, trained certificated midwives and changes in their disposal during the year are shown in Table 60.

Table 60

Distribution of Trained Midwives : 1945

Province.	Newly licensed	Licence cancelled	Transferred		Died	Total remaining
			to	from		
Blue Nile	6	—	—	1	1	73
Darfur	2	—	—	—	—	11
Equatoria	—	—	—	—	—	—
Kassala	4	1	1	—	—	32
Khartoum	5	2	—	—	—	86
Kordofan	3	—	—	—	—	44
Northern	3	4	—	1	2	89
Upper Nile	—	—	—	—	—	6
Totals	23	7	1	2	3	341

The Midwives School uses Omdurman Town and its population as the training material for certain of the practical aspects of the training course, the antenatal clinics, the cases, normal and abnormal, infant and child welfare clinics and associated home visiting. There is also held in the school a weekly gynaecological clinic. Table 61 shows the cases attended by the pupils and staff in relation to the total cases attended in Omdurman and shows the nature of the training material.

TABLE 61.

Omdurman Midwifery Service : 1945.

Cases seen by midwives school : Deliveries and Complications

DETAIL OF CASES.		Number of Cases attended		Total
		By School Staff	By Others	
Attended		643	2,232	2,875
Abortions		—	32	32
Full term in homes		619	2,198	2,817
TRANSFERRED TO HOSPITAL :				
Placenta praevia	3			
Breech	1			
Hydramnios with prolapsed cord	1			
Normal	1			
Forceps cases	2			
Delayed labour	4			
Normal labour	2			
Pre-eclamptic	1			
Eclamptics	2			
Others	9	24	2	26
TOTAL BIRTHS IN HOMES		635	2,256	2,891
(a) Live births		613	2,168	2,781
(b) Still births		22	51	73
(c) Twins, cases of		14	21	35
(d) Triplets, cases of		1	—	1
POST-PARTUM COMPLICATIONS		31	5	36
(a) Retained placenta		1	—	1
(b) Haemorrhage (doctor called in)		5	2	7
(c) Haemorrhage		3	—	3
(d) Pyrexia		14	2	16
(e) Pyrexia after haemorrhage		1	—	1
(f) Pyrexia following sepsis		5	1	6
(g) Sent to hospital		2	—	2

There are antenatal clinics in being at the Midwives School and at the Morada Welfare Centre. Expectant mothers are seen twice weekly at each. Figures for the year 1945 were :—

TABLE 62

CLINICS.	Old Cases		New Cases		TOTAL	
	1944	1945	1944	1945	1944	1945
Midwives School Clinic	2,616	3,323	2,288	2,541	4,904	5,864
Morada Clinic	1,186	1,467	600	661	1,786	2,128
TOTALS	3,802	4,790	2,888	3,202	6,690	7,992

At the gynaecological clinic the following cases were seen :

YEARS.	Old Cases.	New Cases.	Totals
1944	194	283	477
1945	85	152	237

Work at the Morada Welfare Centre which is run in association with the school and where 102 clinics were held totalled 1456 attendances as contrasted with 1890 in 1944. Of these, 338 were new cases as contrasted with 499 in 1944. The Health Visitors paid 502 first visits to homes in 1945 as contrasted with 709 in 1944 and with revisits the totals were 2021 for 1945 contrasted with 2924 for the previous year. (One health visitor was transferred from this centre to open a new centre in Khartoum Deims). These visits included 37 visits to 8 families on poor relief and 22 visits to 19 cases and 66 contacts of 26 cases of tuberculosis notified locally. The woman vaccinator attached to the school did 2211 vaccinations in homes, 28 in the School and 49 at the Morada Welfare Centre. Of these 1970 by follow-up visits were found to be successful and 137 failures.

The Principal made tours in the Blue Nile Province and the Northern Province and again noted the need for continued interest being taken in midwives and their work, equipment and expendible supplies. Other members of the school staff did tours or visits to Atbara, Wadi Halfa, the White Nile, Gedaref, Tendelti, Shendi, Port Sudan, Sinkat, Hassa-Heissa and Abu Usher. They gave a number of refresher courses to midwives in some of these districts.

The Khartoum Province supervision of the local midwives has now become part of the Health Visitors duties and where this category of worker is not available, the Medical Assistant of the nearest dispensary assumes the function.

With a view to gradually replacing all old untrained midwives by trained ones' and in any case, of having some control rather than none, certain selected untrained midwives are being given simple training and licensed as second class midwives. An attempt to train them in short courses in the School itself failed for various reasons. More successful has been found the practice of attaching an untrained but reputable and co-operative folk-practitioner to a fully trained midwife, much as an apprentice, for two months. A staff midwife from the School visits the pair once weekly with a set of teaching equipment and in the local dispensary with the help of the Medical Assistant in charge goes through a set course of training, directed mainly to the basic principles of (a) cleanliness and (b) reliance on the local trained midwife and Medical Assistant, should difficulties arise. When reported ready for examination and generally satisfactory, the Principal or her assistant, visits the village, conducts an examination and, if satisfied, informs the local Medical Officer of Health who recommends the issue of a 2nd class licence, to the local Governor who is the licensing authority.

As part of the training course for the fully trained midwives, it has been found advantageous to attach pupils for a two month period during their training to selected District Midwives.

Every opportunity is being taken by the staff to combat the illegal form of severe female circumcision known as infibulation or pharaonic circumcision. There is no antagonism to the propaganda, the people are willing to talk about it and hear all that is to be said about it. From Sudanese staff it is understood that about half the people in Omdurman are glad of the proposed new legislation against this practice as backing for their personal feeling in the matter while outside the Three Towns it is thought that many people are still unconvinced that the mutilation is wrong and are concerned at possibly being forced to leave their daughters uncircumcised.

CHAPTER XIV

OTHER TRAINING

MEDICAL ASSISTANTS

At Omdurman Civil Hospital the final stage of the eighteen months training course for medical assistants — who are posted in charge of dispensaries and rural health centres — neared its end. There were 28 under training including an appropriate proportion of demobilised warrant officers and N.C.O's of the S.D.F. Medical Corps, who had seen service during the recent war in the Sudan, Abyssinia, Eritrea and Libya.

A new and more intensive course of training lasting a year has been approved by the Board of Studies (Medical Assistants) and should — once it is in its stride — enable this very useful class of public servant to man even more successfully than in the past, the 440 odd dispensaries which treat the majority of the Sudan's tribal sick.

WOMEN NURSES

The first class of Sudanese women nurses of better educated type took their final examinations at Omdurman Civil Hospital and all, eight in number, passed out as the first Sudanese state certificated Nurses. The Principal of the Nursing School is the Matron of the Omdurman Civil Hospital and she has a native staff of seven to assist her. Pupils in the school at the end of the year numbered 38.

The newly certificated nurses were posted as staff nurses to Omdurman Civil Hospital, Khartoum Civil Hospital, Kosti Hospital, Omdurman Quarantine Hospital and Port Sudan Hospital and 3 proceeded to the midwifery course at the Omdurman Midwives School.

BOARDS OF STUDY

Boards of Study are now in existence for the categories of Public Health Officer, Sanitary Overseer, Medical Assistant, Health Visitor, Dispenser, Assistant Radiographer, Nurse, Midwife, Mosquitoman and House-to-house Inspector. In addition there is the Sudan Nursing Advisory Committee. These Boards have duties relating to prescribing curricula, appointing Boards of Examiners and controlling in general the training and qualification of S.M.S. subordinate technical staff. The training of S.M.S. lesser educated nursing orderlies, male and female, and mosquito-men is done by the Medical Officers in hospitals and by local Public Health Officers respectively.

SOUTHERN TRAINEES.

For the filling of posts for Medical Assistants, Dispensers, Laboratory Assistants and Sanitary Overseers in Equatoria training courses are held at the S.M.S. School in Juba Hospital for local candidates. During the year 26 were under training, 6 qualified as Medical Assistants and 2 as Sanitary Overseers.

CHAPTER XV.

THE S.M.S. GRAPHIC MUSEUM.

The Museum was brought to a stage of initial completion in 1944. Revision and adjustment have however to continue and will in fact constitute as much work if not more than the initial building up of the exhibits. In addition a new side of the work is expanding, the provision of propaganda models, posters and other forms of exhibits for health centres and agricultural shows. Recorded visits by the public during the year numbered 3,069.

The standing exhibition comprises :

Photographs	1,935
Charts	200
Drawings	100
Descriptive notes	239
Maps	69
Posters	12
Models	159
Specimens	589

Its sections are :—

1. Ascariasis.
2. Taeniasis
3. Hydatid Disease
4. Malaria
5. Trypanosomiasis
6. Leishmaniasis
7. Syphilis
8. Yaws
9. Relapsing fever
10. Filariasis
11. Diphtheria
12. Ancylostomiasis
13. Schistosomiasis
14. Madura disease
15. Tuberculosis
16. Gonorrhoea
17. Cholera
18. Tetanus
19. Anthrax
20. Cerebrospinal meningitis
21. Plague
22. Rabies
23. Leprosy
24. Measles
25. Mumps
26. Yellow fever
27. Smallpox
28. Chickenpox
29. Vaccinia
30. Dengue
31. Typhus
32. Phlebotamus fever
33. Undulant fever
34. Blackwater fever
35. Eye Diseases
36. Skin diseases
37. Influenza
38. Pneumonia
39. Dysentery
40. Enteric fever
41. Nutrition
42. Maternity and child welfare
43. Quarantine
44. Disinfection
45. Meteorology
46. School medical service
47. Disposal of waste matter
48. Town planning
49. Housing
50. Water
51. Medical entomology
52. Folk medicine
53. Venomous snakes etc.
54. History of Medicine in the Sudan.

In the grounds there are exhibits suitable for use in rural sanitation.

Important additions to the Museum during the year were models of a meat market for a small village, an anti-guinea worm well, a protected village well, a soakaway pit, a double collecting manure pit, an Otway's pit and a washing platform. Other additions were a D.D.T. dusting exhibit and amendments and additions to the sections for Disposal of Waste Matter, Water, Disinfection and Disinfestation, Tuberculosis, Maternity and Child Welfare, Relapsing Fever, Typhus, Taeniasis and Ascariasis.

During the year a loss was sustained by the death of Ali Eff. Osman who over a period of years had shown a talent in modelling that has contributed in no small degree to the effectiveness of many exhibits.

TABLE 1.

APPENDICES

STAFF OF THE SUDAN MEDICAL SERVICE ESTABLISHMENT OF CLASSIFIED OR CERTIFICATED OFFICIALS.

CATEGORY.	ESTABLISHMENT		
	British	Sudanese	Others
Headquarters.			
Director	1	—	—
Assistant Director (Public Health)	1	—	—
Assistant Director (Hopitals)	1	—	—
D.A.D. (Quarantine)	—	1	—
Controller of Medical Stores	1	—	—
Principal Matron	1	—	—
Superintendent	1	—	—
Chief Public Health Inspector	1	—	—
A Chief Public Health Inspector	1	—	—
Head Staff Clerk	—	1	—
Staff Clerk	—	2	—
Clerk	—	22	—
Head Accountant	1	—	—
Accountant	—	1	—
Bookkeepers	—	15	—
Superintendent of Stores	1	—	—
Storekeeper	—	9	—
Hospitals and Dispensaries.			
Senior Physician	1	—	—
Senior Surgeon	1	—	—
Gynaecologist	1	—	—
Ophthalmologist	1	—	—
Medical Inspector	33	14	—
Dental Surgeon	1	—	—
Assistant Ophthalmologist	—	1	—
Medical Registrar	—	1	—
Surgical Registrar	—	1	—
Obstetrical Registrar	—	1	—
Medical Officer	—	66	—
Housemen (recent graduates)	—	11	—
Medical Assistants	—	337	—
Matron, Khartoum Civil Hospital	1	—	—
Matron, Nurses' School, Omdurman	1	—	—
Charge Sister	10	—	—
Nursing Sister	16	—	—
Nurses (certificated)	—	8	—
Radiographer	1	—	—
Dental Mechanic	1	—	—
Assistant Radiographer	—	9	—
Assistant Radiographer under training	—	1	—
Pharmacist	—	—	2
Dispenser	—	9	—
Dispenser under training	—	5	—
Bookkeeper	—	65	—
Clerk	—	6	—
Southern Storekeeper	—	3	—
Head Hospital Orderly, male	—	31	—
Theatre Attendant, male	—	23	—
Carried forward	78	643	2

Category.	Establishment		
	British	Sudanese	Others
Brought forward	78	643	2
Public Health.			
Medical Officer of Health, Khartoum	1	—	—
Asst. Medical Officer of Health, Khartoum ..	—	1	—
A/Medical Officer of Health (Special Duties) ..	1	—	—
Senior Public Health Inspector	7	—	—
Public Health Inspector	2	—	—
Public Health Officer	—	19	—
Sanitary Overseer	—	98	—
Principal, Midwives School	1	—	—
Charge Sister	1	—	—
Supervisor of Health Visitors	1	—	—
Clerk	—	2	—
Staff Midwife	—	2	—
Staff Nurse	—	1	—
Staff Health Visitor	—	1	—
Health Visitor	—	3	—
Research and Laboratory Service.			
Stack Medical Research Laboratories.			
Assistant Director (Research) S.M.S.	1	—	—
Bacteriologist	1	—	—
Assistant Bacteriologist	—	1	—
Laboratory Assistant	4	43	—
Head Laboratory Attendant	2	—	—
Clerk	—	2	—
Medical Entomology.			
Medical Entomologist	1	—	—
Technical Assistant	—	4	—
Clerk	—	1	—
Wellcome Chemical Laboratories.			
Government Analyst	1	—	—
Chemist..	1	—	—
Technical Assistant	—	5	—
Junior Technical Assistant	—	2	—
Clerk	—	1	—
Kitchener School of Medicine.			
Dean	1	—	—
Library Clerk	—	—	1
S.M.S. Graphic Museum.			
Assistant Curator	—	1	—
Museum Attendant	—	3	—
TOTAL	104	833	3

The unclassified employees number approximately 3,500.

TABLE II (a).

INCOME AND EXPENDITURE OF THE S.M.S. OVER THE LAST FOUR YEARS.

ITEMS.	1942	1943	1944	1945
	£E.	£E.	£E.	£E.
Revenue	80,951	72,569	68,313	67,839
Expenditure :				
Personnel and Personal Allowances ..	182,682	213,946	243,969	278,714
Services..	136,887	146,066	227,882	198,596
Extraordinary	2,813	1,901	2,612	4,576
TOTAL	322,382	361,913	474,460	481,886

TABLE II (b)

ANALYSIS OF THE S.M.S. EXPENDITURE IN 1945.

ITEMS.	Personnel	Services	Extraordinary	Total
	£E.	£E.	£E.	£E.
Headquarters	17,052	25,262	190	42,504
Hospitals and Dispensaries	196,974	151,863	3,591	352,428
Hygiene and Public Health	47,473	18,724	440	66,637
Research	15,458	2,747	355	18,560
Graphic Museum	354	—	—	354
Seconded Staff	1,403	—	—	1,403

TABLE III.

SUDAN : 1945

ADMISSIONS AND DEATHS BY DISEASES

		BLUE NILE		DARFUR		EQUATORIA		KASSALA		KHARTOUM		KORDOFAN		NORTHERN		UPPER NILE		TOTAL	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1.	T.B. Pulmonary	140	25	21	7	82	17	135	24	345	44	77	19	127	9	30	6	957	151
2.	T.B. Non-Pulmonary	124	8	18	8	57	—	83	9	181	12	88	5	69	3	23	—	643	40
3.	Syphilis	942	1	4,070	15	3,549	—	628	3	249	—	3,846	10	439	3	976	3	14,699	35
4.	Gonorrhoea	759	1	402	1	978	1	860	—	370	—	1,513	3	440	—	307	—	5,629	6
5.	Soft Sore	75	—	40	—	103	—	35	—	41	—	53	—	17	—	28	—	392	—
6.	Trachoma	57	—	113	—	56	—	63	—	1	—	78	—	173	—	19	—	560	—
7.	All other eye diseases	323	—	223	—	687	—	194	—	1,250	2	544	1	554	—	369	1	4,144	4
8.	Ear	46	1	28	—	317	—	49	—	52	—	100	—	50	—	23	—	665	1
9.	Skin	210	1	128	1	639	—	120	1	140	1	406	3	196	—	33	—	1,872	7
10.	Wounds and other injuries	2,829	57	2,323	34	5,456	84	2,310	36	1,554	30	3,414	42	1,496	28	1,070	13	20,452	324
11.	Tumours Malignant	32	5	9	2	15	2	26	3	109	16	59	12	27	5	4	1	281	46
12.	Tumours Non-Malignant	61	4	9	—	34	—	42	1	127	2	65	1	40	—	9	—	387	8
13.	Gynaecological	424	4	25	—	68	2	173	1	496	5	241	7	144	1	29	2	1,600	22
14.	Confinements	212	15	39	2	88	6	100	5	543	7	144	4	105	4	22	1	1,253	44
15.	Poisoning	61	4	22	2	41	4	3	1	9	—	35	1	23	—	—	—	194	12
16.	Ancylostomias	26	5	2	—	1,449	13	6	—	6	—	11	—	48	—	13	—	1,561	18
17	Schistosomiasis	410	17	11	—	537	10	51	—	72	1	155	1	105	2	18	—	1,359	31
18.	Blackwater Fever	2	1	—	—	5	—	—	—	—	—	2	—	—	—	—	—	9	1
19.	Dysentery, Amoebic	646	23	434	13	98	6	405	13	330	5	597	22	288	1	108	7	2,906	90
20.	Dysentery, Bacillary	60	13	2	—	150	7	75	2	180	4	72	—	15	—	59	3	613	29
21.	Filariasis	14	—	4	—	21	—	—	—	1	—	10	—	—	—	—	—	50	—
22.	Madura disease	123	1	16	—	1	—	21	—	83	2	30	—	42	—	—	—	316	3
23.	Malaria	3,467	76	812	8	2,650	32	2,186	21	765	6	2,051	19	1,260	10	816	23	14,007	195
24.	Leishmaniasis	78	17	2	1	12	1	85	13	11	2	6	—	1	1	4	—	199	35
25.	Trypanosomiasis	—	—	—	—	398	6	—	—	—	—	—	—	—	—	—	—	398	6
26.	Yaws	—	—	4	—	2,387	5	—	—	—	—	—	—	—	—	18	—	2,409	5
27.	Heat Stroke	—	—	—	—	—	—	20	2	—	—	—	—	—	—	—	—	20	2
28.	Dracontiasis	20	—	17	—	551	—	37	—	5	—	104	—	4	—	20	—	758	—
29.	Tropical Ulcer	410	5	189	—	3,649	15	60	—	50	1	593	1	8	1	129	1	5,088	24
30.	Anthrax	2	1	—	—	2	—	—	—	1	1	—	—	—	—	—	—	5	2
31.	Cerebrospinal Meningitis	21	13	3	2	1,128	128	2	2	—	—	5	2	—	—	113	16	1,272	163
32.	Chickenpox	331	—	84	—	201	—	302	—	170	—	301	—	171	—	11	—	1,571	—
33.	Dengue	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
34.	Diphtheria	58	—	—	—	1	—	64	10	147	10	23	12	92	22	4	—	389	54
35.	Enteric Fever	43	2	7	—	5	—	25	1	92	5	9	1	43	2	—	—	224	11
36.	Erysipelas	6	1	—	—	51	3	1	—	1	—	25	—	—	—	—	—	84	4
37.	Gastro Enteritis of Children	14	2	—	—	42	5	64	7	339	45	41	7	19	4	45	6	564	76
38.	Influenza	16	—	15	—	137	—	85	—	65	2	42	1	34	—	8	—	402	3
39.	Leprosy	18	1	18	3	63	1	11	—	—	—	6	1	3	—	5	—	124	6
40.	Undulant Fever	23	—	—	—	6	—	22	1	8	—	8	1	—	—	3	—	70	2
41.	Measles	65	2	79	—	690	10	42	—	128	2	45	—	18	—	72	3	1,139	17
42.	Mumps	66	—	169	—	20	—	135	—	62	—	203	—	27	—	2	—	684	—
43.	Pellagra	1	1	—	—	—	—	2	—	1	—	—	—	—	—	—	—	4	1
44.	Puerperal Fever	13	1	1	—	—	—	2	1	17	—	12	3	13	2	—	—	58	7
45.	Phlebotomus Fever	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
46.	Pneumonia	959	113	219	27	716	64	352	34	1,106	65	411	31	236	19	66	—	3,975	353
47.	Rabies	2	2	—	—	—	—	1	1	—	—	2	2	6	—	—	—	11	5
48.	Relapsing Fever	771	37	87	160	1	—	361	58	568	—	241	15	9	—	1,559	43	3,597	313
49.	Acute Rheumatism	15	1	—	—	40	—	58	—	49	1	15	—	91	—	12	—	280	2
50.	Smallpox	—	—	—	—	—	—	3	—	1	—	—	—	—	—	—	—	4	—
51.	Tetanus	9	6	4	1	33	17	6	4	7	4	9	8	7	4	2	2	77	46
52.	Whooping Cough	29	—	—	—	18	2	21	—	65	1	24	—	6	—	65	2	228	5
53.	Circulatory System	390	49	26	5	250	20	154	25	452	48	195	—	219	20	31	5	1,717	172
54.	Respiratory System	419	15	84	2	1,911	27	426	17	923	28	976	23	616	25	225	13	5,580	150
55.	Alimentary System	1,201	81	209	10	2,365	107	493	56	1 584	42	1,159	59	1,118	40	404	23	8,533	418
56.	Genito-Urinary System	361	20	98	4	203	10	336	7	368	13	378	60	300	14	60	1	2,104	129
57.	Nervous System	78	10	18	2	60	4	78	3	152	9	81	28	58	1	22	—	547	57
58.	Scurvy	12	2	—	—	13	1	30	—	10	—	28	5	—	—	2	—	95	8
59.	Diabetes	27	4	2	1	3	1	29	1	122	8	12	—	36	2	1	—	232	17
60.	Fever of uncertain origin	512	39	60	1	244	11	480	20	414	24	148	21	255	9	79	12	2,192	137
61.	All Other Diseases	932	52	223	7	2,104	32	728	12	2,113	46	956	44	948	10	893	10	8,897	213
																River Hospital		3,490	
	TOTAL	17,945	739	10,370	314	34,885	654	12,080	395	15,845	494	19,649	475	9,996	244	7,811	197	131,571	3,510

Table IV.

SUDAN : 1945

OUT-PATIENTS

NEW CASES AND TOTAL ATTENDANCES

Disease	Blue Nile	Darfur	Equatoria	Kassala	Khartoum	Kordofan	Northern	Upper Nile	Total
1. T. B Pulmonary	167	21	120	183	317	107	193	23	1,131
2. T. B. Non-Pulmonary ..	174	18	46	112	166	110	17	1	644
3. Syphilis	14,181	13,062	5,585	10,921	3,846	21,828	3,933	7,779	81,135
4. Gonorrhoea	4,464	1,286	2,094	3 727	3,547	4,237	1,265	693	21,313
5. Soft Sore	1,703	237	364	2,147	1,009	418	94	47	6,019
6. Trachoma	43,503	4,784	913	18,279	122,497	5,001	40,042	375	235,394
7. All other eye diseases ..	84,560	8,613	29,608	35,414	2,803	33,150	44,249	8 963	247,360
8. Ear	16,527	2,115	6,651	10,625	201	7,418	10,037	1,295	54,869
9. Skin	15,304	3,516	13,275	4,320	1,030	17,301	3,819	1,141	59,706
10. Wounds and other injuries	141,566	27,437	80 283	110,074	70,892	62,466	51,109	10,088	553,915
11. Tumours Malignant	32	9	12	26	100	89	21	2	291
12. Tumours Non-Malignant ..	2,838	11	147	239	287	133	259	17	3,931
13. Gynaecological	657	47	66	343	1,896	540	237	128	3,914
14. Confinements	129	54	52	92	589	151	33	31	1,131
15. Poisoning	38	28	15	7	3	58	50	—	199
16. Ancylostomiasis	26	28	4,407	47	20	27	66	—	4,621
17. Schistosomiasis	4,820	1,050	2,079	1,071	441	4,253	1,786	71	15,571
18. Blackwater Fever ..	5	—	6	—	—	2	—	—	13
19. Dysentery, Amoebic ..	8,108	1,905	389	4,456	3,201	3,379	3,740	551	25,729
20. Dysentery, Bacillary ..	209	2	72	520	156	156	140	—	1,255
21. Filariasis	14	4	55	—	1	86	—	—	160
22. Madura Disease	650	16	1	23	108	35	3	—	836
23. Malaria	112,493	6,839	10,840	21,604	6,186	32,348	14,523	8,773	213,606
24. Leishmaniasis	78	2	11	85	9	8	—	—	193
25. Trypanosomiasis	—	—	39	—	—	—	—	—	39
26. Yaws	—	47	19,794	—	—	1	4	20	19,866
27. Heat Stroke	—	—	—	20	11	—	—	—	31
28. Dracontiasis	164	17	1,833	137	4	524	2	80	2,761
29. Tropical Ulcer	4,586	605	17,972	2,164	340	2,297	14	1,039	29,017
30. Anthrax	2	—	2	—	6	1	—	1	12
31. Cerebrospinal Meningitis ..	29	3	703	2	1	11	3	103	855
32. Chickenpox	1,780	115	360	295	367	620	566	4	4,107
33. Dengue	1	—	—	—	—	—	—	—	1
34. Diphtheria	58	1	2	66	132	26	11	—	296
35. Enteric Fever	43	7	1	25	68	9	30	—	183
36. Erysipelas	6	—	—	1	1	25	—	—	33
37. Gastro-enteritis of children ..	3,569	40	352	448	2,185	314	1,278	719	8,905
38. Influenza	2,659	445	927	3,127	1,911	785	1,169	54	11,077
39 Leprosy	135	26	74	41	1	36	6	3	322
40 Undulant Fever	23	2	3	22	7	11	—	—	68
41 Measles	1,330	160	2,043	141	688	222	535	379	5,498
42. Mumps	3,999	408	21	1,231	699	1,120	299	56	7,833
43. Pellagra	9	—	—	2	1	—	—	—	12
44. Puerperal Fever	23	1	—	2	22	18	18	—	84
45. Phlebotomus Fever	—	1	—	—	—	—	—	—	1
46. Pneumonia	2,018	268	683	617	1,443	896	1,068	147	7,140
47. Rabies	6	38	—	1	2	4	12	—	63
48. Relapsing Fever	4,698	1,068	1	1,779	924	1,683	1	6,173	16,327
49. Acute Rheumatism	703	—	2,332	1,332	80	191	2,919	73	7,630
50. Smallpox	—	—	—	3	1	—	—	—	4
51. Tetanus	9	4	24	6	4	9	3	2	61
52. Whooping Cough	3,092	26	123	654	440	354	756	403	5,848
53. Circulatory System	3.933	228	218	2.413	3,251	3,276	5,581	426	19,326
54. Resp'ratory System	86,010	8,894	40,550	46,607	49,740	40,951	33,347	7,525	313,624
55. Alimentary System	108,598	16,724	32,421	60,499	70 867	53,198	54,741	9,478	406,526
56. Genito-Urinary System ..	5,567	1,904	355	5,967	6,226	4,776	5,469	336	30,600
57. Nervous System	4,237	42	39	551	271	916	4,102	18	10,176
58. Scurvy	105	—	8	148	23	85	2	44	415
59. Diabetes	37	2	2	86	182	18	42	—	369
60 Fever of uncertain origin ..	28,148	878	1,741	12,261	16,626	5,202	10 553	2,566	77,975
61. All Other Diseases	71,426	935	33,494	32,828	36,946	27 332	33,515	9,106	254,006
Total New Cases	789,249	112,397	313,208	397 791	412,775	338,212	331,662	78,733	2,774,027
Atendances : Men	765,368	171,629	483,334	462,536	442,533	476,134	299,075	94,518	
Women	410,033	92,506	198,011	164,098	229,539	328,755	206,879	56,714	
Children ..	691,948	117,110	233,599	241,892	646,035	510,561	491,206	68,568	
Attendances Total	1,867,349	381,245	914,944	868,526	1,318,107	1,315,450	997,160	219,800	7 882,581
							RIVER	HOSPITAL	14,567
									7,897,148

DIAGRAM I

SUDAN : 1945

MORTALITY i.e. DEATHS IN HOSPITALS AND DISPENSARIES BY DISEASES

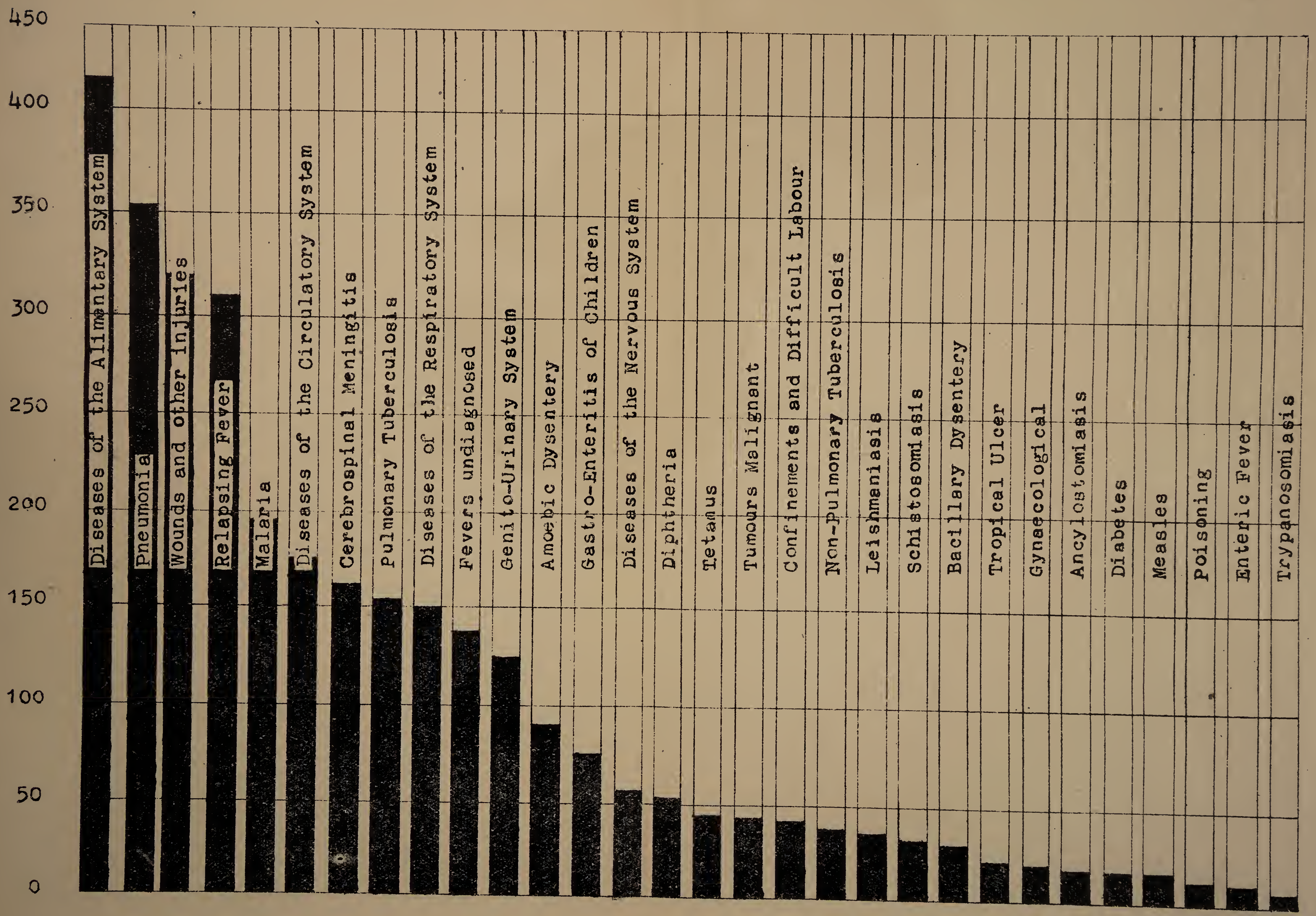
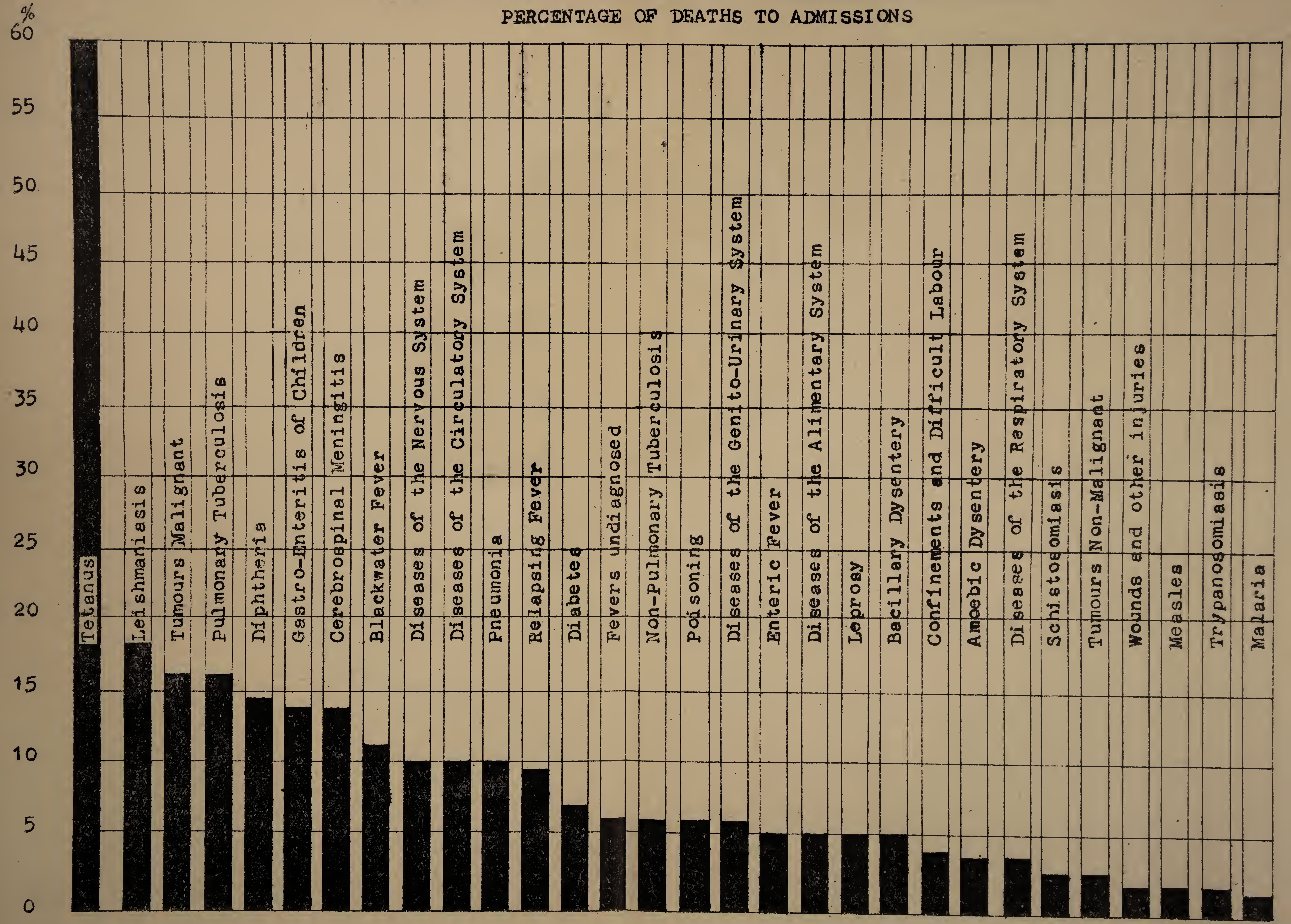


DIAGRAM II
SUDAN : 1945
FATALITY RATE IN HOSPITALS AND DISPENSARIES BY DISEASES
PERCENTAGE OF DEATHS TO ADMISSIONS



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